Thinking in Lines and Circles:
Geometric Script Patterns and Visualization of Knowledge in Medieval Islamicate Societies (1100–1250 AD)

by

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We acknowledge and respect the lək̓ʷəŋən peoples on whose traditional territory the university stands and the Songhees, Esquimalt and W̱SÁNEĆ peoples whose historical relationships with the land continue to this day.

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Abstract

What do we *see* when we look at writing? In addition to the verbal messages conveyed by the written words, visual dimensions of script are powerful tools that hold semantic value. This dissertation focuses on one such visual element—the arrangement of written words into geometric shapes or patterns in the context of medieval Islamicate societies (1100–1250 AD)—to uncover its meanings. The dissertation offers a primary case study of the *Kitāb al-diryāq* (*Book of Antidotes*, 595 AH/1199 AD, BnF arabe 2964), an illuminated and illustrated manuscript with a variety of geometric patterns created using Arabic script. By examining a broad range of materials (scientific manuscripts, magical objects, and architectural decoration) across Late Antiquity and the medieval period, this heuristic study argues that the arrangement of script in geometric patterns was a vital medium of visualizing knowledge and transmitting knowledge—the form not only carrying cultural meanings, but also shaping the reception of verbal messages. Magic is one form of knowledge that is particularly fruitful for examining the function of the geometric script patterns in general, and of the *Kitāb al-diryāq* in particular. This study traces the contexts in which the geometric script patterns appear, the cultural practices associated with them, and the medieval worldviews in which the patterns circulated. In considering these factors, the study argues that the combination of shape and script is embedded with knowledge that reflects the medieval scientific, magical, and popular imagination.

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Notes on Transliteration and Dating

In this dissertation, all Arabic terms are transliterated according to the *International Journal of Middle East Studies (IJMES)* system. Personal and place names, however, do not include dotted consonants and long vowels, although the *hamza* and *'ayn* are retained. Anglicized words (such as mihrab, Qur'an) are not transliterated. The plural forms of Arabic terms are specified by an unitalicized s added to end of the term.

For names in Greek and Latin, the dissertation follows the forms that most commonly appear in publications. For example: Galen rather than Galenos, Galenus, or Jalinus.

All dates mentioned are given according to the *Anno Domini* system unless noted otherwise.

The dissertation follows the notes and bibliography system of *The Chicago Manual of Style* (17th Edition).

Introduction

Nomen meum magis intellegi quam legi promptum est
(My name was presented more to be understood than to be read)[1]

What do we *see* when we look at writing? The words on a page, on portable objects, and on architectural elements generally present discernable verbal messages to their audiences—that is, to those who know both how to read the written words and what they mean in a given combination. While conveying the meaning of the words through the physical form of the script is normally the main function of something written, the writing itself, in its visual components, can also communicate information linked to or separate from the semantic sense. In doing so, the visual components offer information about a given culture and its norms, beliefs, and practices. The quote from the Late Roman statesman, Quintus Aurelius Symmachus (c. 340–402), at the beginning of this section, reveals how script in Late Antiquity can be understood as more than a simple vehicle for a sequence of words conveying verbal meaning. In his quote, Symmachus refers to the design of his monogram (from Greek, *mono*: single; *gramma*: something written), which is a set of letters (two or more) presented as a single graph. Explaining the composite, interlocking pattern of letters—the patterns designed to be visually grasped at once—the statesman contends that the presentation of the script (that is, the set of graphic signs) was intended not to be read for its verbal message; rather, the visual formation on the monogram was designed to be understood, through looking.[2] The

[1] Quintus Aurelius Symmachus, Epistolae, II, in *Symmachi opera*, ed. Otto Seeck (Berlin: Weidmannos, 1884), 64. Translation taken from Ildar Garipzanov, *Graphic Signs of Authority in Late Antiquity and the Early Middle Ages, 300–900* (Oxford: Oxford University Press, 2018), 1.

[2] Garipzanov, *Graphic Signs*, 1–3.

comprehension of the monogram is a result of *viewing* the script as opposed to *reading* the words.

Visual dimensions of script—style, scale, location, spatial organization, letter style, word spacing, clarity, and legibility[3]—are powerful tools that hold semantic value, often independent from the script's verbal content. This dissertation focuses on one such visual component of Arabic script: the arrangement of written words into geometric shapes or patterns in the context of medieval Islamicate societies (1100–1250), prior to the Mongol invasions of the thirteenth century (for a discussion of the temporal limits of this dissertation, see Theoretical Framework and Methodology). Such script patterns range from simple constructions, such as the script encircling an image, text, or wrapping around a monument, to extensive manipulation of the ligatures into complex compositions. The words and phrases often appear in both linear and non-linear orientations, creating intersecting, perpendicular, parallel, and curved constructions. The variety of planar renditions of the script give rise to formations of circles, squares, rectangles, triangles, pentagrams, hexagrams, spirals, chevrons, or a combination of those shapes. In these patterns, it is the physical orientation of the script—rather than the letterforms or the content of the words—that is orchestrated to create the patterns. In some instances, one notices the appearance of script and geometric frames in tandem, where the script emulates the geometric lines, adapting its ligatures at intersections to be consistent with the pattern. Other times, the script itself becomes a framing device, presenting a shape in the absence of its geometric counterparts. The elongated strokes and varied planar orientations of the words take on a prominent visual character, privileging

[3] Anthony Eastmond, "Introduction: Viewing Inscriptions," in *Viewing Inscriptions in the Late Antique and Medieval World*, ed. Anthony Eastmond (Cambridge: Cambridge University Press, 2015), 1.

the shape or pattern as opposed to the legibility of the text. The malleable ligatures further challenge the readability of the words—at times, a deliberate attempt by the scribe or craftsman to render the words indecipherable. The composition becomes better suited to be *viewed* instead of being *read*. In this regard, the multidirectional Arabic script patterns are not far in construction from the monogram of the Roman statesman and can, similarly, be approached by way of *intellegi* rather than *legi*.

Research Focus and Contribution

The intricate script patterns in the medieval Islamicate world are disseminated across cultural and political boundaries, and are present in public architecture, coins, scientific objects and treatises, objects of devotion and piety, as well as magical objects and manuals. While the visual significance of Arabic texts in monumental and portable arts has been widely discussed, script patterns in geometric arrangements have only recently become the primary subject of attention in scholarship.[4] When the geometric script patterns are discussed, they are largely studied with respect to their verbal messages.[5] They serve as a background, seldomly the foreground.[6] While the verbal content is significant, the meanings created by the visual prominence (or lack of), location, and

[4] Some studies that have examined the placement of Arabic text in patterns include: Marcus Milwright, *The Dome of the Rock and its Umayyad Mosaic Inscriptions* (Edinburgh: Edinburgh University Press, 2016); and Sean Leatherbury, *Inscribing Faith in Late Antiquity: Between Reading and Seeing* (New York, NY: Routledge, 2020). For the visual significance of monumental script more generally, see also Mohammad Gharipour and İrvin Cemil Schick, eds., *Calligraphy and Architecture in the Muslim World* (Edinburgh: Edinburgh University Press, 2013).

[5] See for instance the discussion of the geometric script patterns in Yasser Tabbaa, "Mosque of Nur al-Din in Mosul," *Annales Islamogiques* 36 (2002): 339–60.

[6] See also the focus on textual content in discussions of pharmacological tables: Emilie Savage-Smith, "Ibn Baklarish in the Arabic Tradition of Synonymatic Texts and Tabular Presentations," in *Ibn Baklarish's Book of Simples: Medical Remedies between Three Faiths in Twelfth-Century Spain*, ed. Charles Burnett (London: Arcadian Library in association with Oxford University Press, 2008), 113–29.

legibility of text, as well as the meanings generated by viewer engagement with the script patterns do not surface in scholarly discussions. By focusing specifically on the orchestration of the graphic elements of writing (the script as such) rather than its verbal elements (the text)—although the verbal meaning is not ignored—my research asks: *where do geometric script patterns occur and what meanings might they communicate (in their contextual settings)?* Although it is impossible to recreate the medieval viewer's experience with geometric script patterns, placing the images in the intellectual, social, cultural, and political context of their creation and consumption provides a method of beginning to interpret possible meanings associated with them (sometimes called the "period eye").[7] Visual compositions and their reading (or viewing) are rarely independent from the societies in which they emerge; neither are they isolated from intellectual and cultural threads operating within the society. W.J.T Mitchell discusses this deep-rooted integration of visual culture within the fabric of society, highlighting visual images and diagrams as entities embedded with multiple narratives.[8] In order to comprehend such narratives, this dissertation explores medieval worldviews and the diversity of religious and cultural practices that may have informed the construction and reception of script patterns. It engages with the spatial and ritual contexts of script patterns, particularly movement and sensation as fundamental forms of knowledge characteristic of Late

[7] The concept of the "period eye" was proposed by Michael Baxandall, *Painting and Experience in Fifteenth-Century Italy*: *A Primer in the Social History of Pictorial Style* (Oxford: Oxford University Press, 1988). For discussions of this idea, see also Robert Nelson, ed., *Visuality Before and Beyond the Renaissance: Seeing as Others Saw* (Cambridge: Cambridge University Press, 2000); and Leatherbury, *Inscribing Faith*.

[8] W.J.T. Mitchell, *Image Science: Iconology, Visual Culture and Media Aesthetics* (Chicago: University of Chicago Press, 2015).

Antique and medieval societies.[9] By examining a broad range of materials, I argue that the arrangement of text in geometric patterns was a vital medium of transmitting knowledge—the form not only carrying cultural meanings, but also shaping and influencing the reception of verbal messages. The geometric script patterns visually and semantically shape knowledge.

The dissertation offers a case study of an illuminated and illustrated manuscript, the *Kitāb al-diryāq* (*Book of Antidotes*, 595 AH/1199 AD, BnF arabe 2964), attributed to the region of northern Mesopotamia (known as the Jazira). The manuscript features a variety of simple and complex geometric patterns using Arabic script that have been largely overlooked in scholarship—even though the treatise is one of the seminal objects in the study of painting in medieval Islam (see Chapter 1).[10] In order to demonstrate the range of intellectual and cultural knowledge embedded within the multivalent geometric patterns, the dissertation examines the ways in which different genres (science, magic, piety, politics) experiment with and ascribe meanings to this combination of script and shape. Magic is one of the genres that is particularly fruitful for examining the function of the geometric script patterns in general, and of the *Kitāb al-diryāq* in particular. In addition to the closeness of subject and visual matter (of magic and the *Kitāb al-diryāq*), magic forms a core component in this study for its significance in Late Antique and

[9] See for instance, Liz James, "Senses and Sensibility in Byzantium," *Art History* 27 (2004): 522–37; and Amy Papalexandrou, "Text in Context: Eloquent Monuments and the Byzantine Beholder," *Word and Image* 17:3 (2001): 259–83.

[10] The topic is broached in Oleg Grabar, "An Essay in Interpretation," in *Kitāb al-diryāq (Thériaque de Paris), édition en facsimilé du manuscrit arabe 2964 de la BnF* (Sansepolcro: Aboca Museum, 2008–9), 21–34.

medieval societies as a "way of seeing" the world (see below for a definition of magic).[11] Moreover, Arabic script as a visual tool has been employed in objects and practices related to magic, especially in stylized and patterned appearances, such as in the geometric script patterns that constitute the subject of this study (see below for script and magical efficacy). The dissertation studies the arrangement and orientation of script, in particular the multifaceted ways in which script is employed in conjunction with, or presented as, geometric shapes. By reading the visual matter of script and the graphic components of patterns, I argue that such multivalent shapes and patterns are embedded with magical ideas and beliefs, lending meaning to makers and beholders of material culture.

This dissertation contributes to scholarly discussions in the following ways. First, the study demonstrates the significance of visual modes of knowledge creation and transmission. The combination of line, space, and form has the capacity to embody elements of medieval worldviews, cultural patterns, and performative rituals. This study extracts the possible meanings of such visual formations, in turn highlighting ideas of perception, cultural understandings, transcultural exchanges, and social histories. Second, the study contributes to the conceptualization of magic as a category of knowledge in the medieval period—one that is inextricably intertwined with modern conceptions of "science" and "religion." The widespread social system of magic has been a relatively unexplored arena in examining the arts—script in particular—from the Jazira region, despite that many of the earliest extant materials relating to magic stem from this

[11] John Berger, *Ways of Seeing* (London: British Broadcasting Company; Penguin, 1972). For magic as a significant part of medieval Islamicate societies, see also Edgar Francis, "Magic and Divination in the Islamic Middle East," *History Compass* 9/8 (2011): 622–33; and Chapter 3.

period.[12] However, given the growing scholarship on magic more generally, this study focuses on the visual manifestation of magical beliefs and practices, placing the vocabulary of magic within the larger discussion on Late Antique and medieval approaches to visual images.[13] In doing so, the study also attempts to bridge the gap between the material culture of magic and the intellectual culture of magic. Lastly, the study pushes the boundaries of time and space (see Methodology) to highlight the shared artistic and cultural patterns between Muslims, Christians, Jews, and other religious and non-religious communities, as well as the mobility of ideas and practices across medieval geographies.

Defining Magic

In this dissertation, magic is defined as knowledge and practices (including writing) aimed at exercising control over or obtaining access to hidden forces. Generally, such encounters relate to time (such as knowledge of the future), health (cures, prophylaxis), and the desire to comprehend the world and one's relationship to it.[14] This expansive

[12] The seminal discussion related to material culture and magic of the twelfth and thirteenth centuries is still Francis Maddison, Emilie Savage-Smith, Ralph H. Pinder-Wilson, and Tim Stanley, eds., *Science, Tools & Magic*, Vols. 1 and 2 (London: The Nour Foundation in association with Azimuth Editions and Oxford University Press, 1997). See also Sheila Canby, "Astrology, Magic, and the World of Beasts," in *Court and Cosmos: The Great Age of the Seljuqs*, ed. Sheila Blair, Deniz Beyazit, Martina Rugiadi, and A. C. S. Peacock (New York: Metropolitan Museum of Art, 2016), 198–249.

[13] Some recent publications on magic include, Liana Saif, *The Arabic Influences on Early Modern Occult Philosophy* (New York: Palgrave Macmillan, 2015); Liana Saif, Francesca Leoni, Matthew Melvin-Koushki, and Farouk Yahya, eds., *Islamicate Occult Sciences in Theory and Practice* (Leiden: Brill, 2021).

[14] Definition adapted from the following works: Michael Bailey, "The Meanings of Magic," *Magic, Ritual and Witchcraft* 1, no. 1 (2006): 1–3; Simon Franklin, *Writing, Society and Culture in Early Rus, c. 950-1300* (Cambridge: Cambridge University Press, 2002), 256–7; Owen Davies, *Magic: A Very Short Introduction* (Oxford: Oxford University Press, 2012), 1; and David d'Avray, "The Concept of Magic," in *The Routledge History of Medieval Magic*, ed. Sophie Page and Catherine Rider (London: Routledge, 2019), 52.

definition recognizes magic as a "kind of knowledge" (practical and intellectual) and a "way of knowing" the world—an integrated system that finds resonances with the larger, all-encompassing nomenclatures, particularly that of "science" and "religion."[15] In addition to providing one with meaning and tools to comprehend the world, many forms of magic equip individuals with agency: one has the power and the capability to engage with, alter, or manipulate an ordered universe. It must be noted that this definition of magic does not reflect a particular time period or geographic area; rather the concept is defined as a means to bring together a diverse range of objects that used to deal in some capacity with the hidden or unseen world. The chapters in this dissertation cover the elements included in this broad definition, ranging from objects associated with magic such as amulets, talismans, and seals, to the world of occult sciences, broadly conceived to include divination, alchemy, and esoteric thought, amongst others. The rubric of magic also includes materials that relate to religion and mysticism (see Glossary for definitions and Chapters 3–5 for a discussion of related objects).

This broad, inclusive definition of magic is proposed for several reasons. First, it is suited to account for materials in this dissertation that intersect with religion and science. The fluid or shifting boundaries of the categories of magic, religion, and science are especially pertinent for the Late Antique and medieval period under consideration (see Methodology for a discussion of the temporal framework), as the categories have largely been separated and made distinct only in the sixteenth and seventeenth

[15] For magic as an abstract, yet integrated system in the medieval world see Claire Fanger, "For Magic: Against Method," in *The Routledge History of Medieval Magic*, ed. Sophie Page and Catherine Rider (London: Routledge, 2019), 26–36; for magic in medieval Islamic intellectual and esoteric writings, see Liana Saif, "From *Ghāyat al-ḥakīm* to *Shams al-Maʿārif*: Ways of Knowing and Paths of Power in Medieval Islam," *Arabica*, no. 64 (2017): 297–345.

centuries.[16] Recent scholarship acknowledges the variety of forms and meanings of magic in the medieval period and approaches the topic by choosing to focus on either a specific form of magic or a particular time and space;[17] alternatively, creating a more comprehensive definition of magic enables a comparative approach between different cultural frameworks and brings together materials for new findings.[18] David d'Avray is one such proponent of an inclusive definition of magic, advocating for terms such as "religious magic" and "non-magical religion," the former comprising of magical rituals within the framework of religion, and the latter including practices that do not serve personal motivations.[19]

Magical literature and material culture in medieval Islam reflect this fluidity of categorization, particularly in relation to religion and science (see Chapter 3 for an overview of *siḥr*, the Arabic term for magic). For instance, Michael Dols defines magic in Islamicate societies as a "supercharged prayer," where magical vocabulary from the Qur'an, among other religious vocabulary, is employed to serve the needs of the

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[16] Stanley Tambiah, *Magic, Science and the Scope of Rationality* (Cambridge: Cambridge University Press, 1990), 140. For the debate on magic, religion, and science, and the rise of "science" in the early modern period, see Keith Thomas, *Religion and the Decline of Magic* (Harmondsworth: Penguin, 1971); for examining magic from a medieval perspective, see Richard Kieckhefer, "The Specific Rationality of Medieval Magic," *The American Historical Review* 99 (1994): 813–36. For an overview and historiography of the categories of magic, science, and religion as they relate to the study of Islam, see Matthew Melvin-Koushki, "Introduction: De-orienting the Study of Islamicate Occultism," *Arabica* 64 (2017): 287–95.

[17] For scholarship that contests the use of the ambiguous and polyvalent term "magic," see Richard Kieckhefer, "Rethinking How to Define Magic," in *The Routledge History of Medieval Magic*, ed. Sophie Page and Catherine Rider (London: Routledge, 2019), 15–25; and Bernd-Christian Otto, "A Discourse Historical Approach Towards Medieval Learned Magic," in *The Routledge History of Medieval Magic*, ed. Sophie Page and Catherine Rider (London: Routledge, 2019), 37–47. See also Bailey, "The Meanings of Magic," 1–23.

[18] See especially the discussions on defining magic in Page and Rider, *The Routledge History of Medieval Magic*.

[19] d'Avray, "The Concept of Magic," 52–3.

practitioner.[20] On the other hand, medieval Arabic literature on astrology and astral magic considers itself a subset of natural philosophy, rejecting any affiliations with supernatural entities.[21]

This challenge of labelling brings me to the second reason for the use of the proposed definition: there was no consensus in medieval societies about the use of the term. Theologians, scholars, and the unlettered had varied interpretations of the term and its applicability in ritual practices (see also Chapter 3). Lastly, the materials surveyed in the chapters deal with a large time period (from Late Antiquity to the thirteenth centuries; see Methodology) and include geographic regions beyond the Islamic world. The inclusive definition of magic proposed at the beginning of this section delineates a more cohesive category that accounts for a plurality of practices dealing with the hidden world, and in which materials intersecting with religion and science can comfortably coexist.

Script and Magical Efficacy

In art historical discourse, Arabic script has been examined from multiple perspectives. Studies have focused on the stylistic evolution of script and paleographic analysis;[22] or have used epigraphy to adduce historical facts.[23] Script and inscriptions in the Islamic

[20] Michael Dols, "The Theory of Magic in Healing," in *Magic and Divination in Early Islam*, ed. Emilie Savage-Smith (Aldershot: Ashgate, 2004), 87.

[21] Saif, "From *Ghāyat al-ḥakīm*," 297. See also Charles Burnett, "Talismans as Science? Necromancy among the Seven Liberal Arts," in *Magic and Divination in the Middle Ages: Texts and Techniques in the Islamic and Christian Worlds* (Aldershot: Variorum, 1996), 1–15.

[22] See François Déroche, *The Abbasid Tradition: Qur'ans of the 8th to the 10th centuries AD, The Nasser D. Khalili Collection of Islamic Art* (Oxford: Oxford University Press, 1992).

[23] For example, Sheila Blair, *Islamic Calligraphy* (Edinburgh: Edinburgh University Press, 2006).

world have also been articulated as a symbolic vehicle of political and theological currents.[24] Recent scholarship—of Late Antique and medieval scripts—is expanding the realm of epigraphic study to include the socio-cultural aspects of production and reception of scripts.[25] Among these, a growing body of scholarship illustrates the magical and apotropaic significance of script in material culture as one of the ways in which viewers interacted with epigraphy. This relationship between script and magic can be traced at least to Late Antiquity where Greek, Aramaic, and Hebrew scripts and pseudo-scripts were employed in magical objects and practices. The act of writing incantations and spells on papyri and ceramic bowls allowed for the magical ritual to become visible, enduring, and permanent.[26] By physical association with the script, the object onto which the written word was inscribed also takes on magical properties. The use of script in amulets as a source of lasting protection was equally prevalent in medieval Europe, where Latin script and script-like characters were inscribed on paper or parchment and worn by individuals.[27] In Islamicate societies, Arabic script is instrumental to the potency of magical objects, appearing in amulets, seals, and talismans, to magic-medicinal bowls,

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[24] Examples include Yasser Tabbaa, *The Transformation of Islamic Art during the Sunni Revival* (Seattle: University of Washington Press, 2001); and Gülru Necipoğlu, *The Topkapı Scroll: Geometry and Ornament in Islamic Architecture* (Santa Monica, CA: Getty Center for the History of Art and the Humanities, 1995).

[25] See the chapters in Eastmond, *Viewing Inscriptions*. For the Islamicate world, see also Jamal Elias, *Aisha's Cushion: Religious Art, Perception, and Practice in Islam* (Cambridge: Harvard University Press, 2012), 236–83; and Marcus Milwright, "Contextual Readings of Religious Statements in Early Islamic Inscriptions," in *The Study of Islamic Origins: New Perspectives and Contexts*, ed. Mette Mortensen, Guillaume Dye, Isaac Oliver, and Tommaso Tesei (Berlin, Boston: De Gruyter, 2021), 275–96.

[26] Daniel James Waller, "Transferring Performativity from Speech to Writing: Illocutionary Acts and Incantation Bowls," *Bulletin of the School of Oriental and African Studies* 82, no. 2 (2019): 239.

[27] Don Skemer, *Binding Words: Textual Amulets in the Middle Ages* (University Park: Pennsylvania State University Press, 2006).

mirrors, and everyday tools.[28] One of the noticeable characteristics of script when used on such objects is its rendition in archaic and (to the modern viewer, at least) undecipherable forms, making the script challenging to read. For instance, magical objects from medieval Islamicate societies often employ script in the angular (Kufic) style—an archaic variety—rather than the prevalent cursive script style. Oftentimes the script is composed in reverse, or letter-shapes are strung together in a meaningless fashion.[29] To further complicate the reading, some scripts connect angular letters with a horizontal line spanning the base of the letters (known as Linear Kufic) or employ special characters (lunette script) whose meaning remains elusive to the modern viewer.[30] In addition to the use of Arabic script, inscriptions in Greek, Hebrew, and Syriac script are also charged with talismanic properties in Islamicate societies due to their illegible visual form (to many people) and their tangible connections to antiquity.[31] In Byzantine contexts, the same practice occurs, but reversed: the foreign nature of Arabic script or pseudo-script is employed on materials primarily for its supernatural properties and

[28] See Maddison et al., *Science, Tools, and Magic*.

[29] Venetia Porter, "Stones to Bring Rain? Magical Inscriptions in Linear Kufic on Rock-Crystal Amulet Seals," in *Rivers of Paradise: Water in Islamic Art and Culture*, ed. Sheila Blair and Jonathan Bloom (New Haven and London: Yale University Press, 2009), 131–59.

[30] The term "Linear Kufic" was first put forward by P. Casanova, "Alphabets magiques arabes," *Journal Asiatique* 18 (1921): 37–55. For more on magic scripts, see Porter, "Stones," 131–59; and Venetia Porter, "The Use of the Arabic Script in Magic," *Proceedings of the Seminar for Arabian Studies* 40 (2010): 131–40.

[31] See Julia Gonnella, "Columns and Hieroglyphs: Magic 'Spolia' in Medieval Islamic Architecture of Northern Syria," *Muqarnas* 27 (2010): 105; and Finbarr Barry Flood, "Image against Nature: Spolia as Apotropaia in Byzantium and the Dar al-Islam," in Mapping the Gaze – Vision and Visuality in Classical Arab Civilisation, a special issue of *The Medieval History Journal* 9, no.1 (2006): 148.

association with the occult.[32] Such a prominent role of script in magical objects across cultural traditions highlights the inextricable connection between script and magical practice.

In addition to material culture, intellectual strands associated with the occult sciences in medieval Islam, including esoteric thought, privileged Arabic script and its individual letters, placing them within the spectrum of cosmic creation. In doing so, the letters became the gateway to the supernatural world. The cosmic and magical significance of speech and the spoken word is discussed in the eighth century, in the works of the celebrated philosopher, Yaʿqub b. Ishaq al-Kindi (d. 873).[33] By the twelfth and thirteenth centuries, an entire genre of literature, known as the '*ilm al-ḥurūf* (science of letters or lettrism), is sufficiently developed to explain the secrets and mysteries associated with words and Arabic letters. Building on magical theories from natural philosophy, these writings emphasize Arabic letters (sound and visual form) as sources of power and become integral to mystical Sufi doctrines.[34] Most famous are the writings of the occultist, Ahmad al-Buni (d. c. 1225), who explicates the magical and transcendent qualities of individual letters of the Arabic language and the ninety-nine names of God.[35] The cosmological and esoteric significance of the Arabic letters and script is augmented

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[32] See Alicia Walker, "Meaningful Mingling: Classicizing Imagery and Islamicizing Script in a Byzantine Bowl," *The Art Bulletin*, vol. 90 (2008): 32–53.

[33] Charles Burnett, "The Theory and Practice of Powerful Words in Medieval Magical Texts," in *The Word in Medieval Logic, Theology and Psychology*, ed. Tetsurō Shimizu, Kent Emery, and Stephen M. Metzger (Turnhout: Brepols, 2009), 215–31.

[34] For a chronological evolution of the developments from natural philosophy to mystical theology, see Saif, "From *Ghāyat al-ḥakīm,*" 297–345.

[35] See Noah Gardiner, "Forbidden Knowledge? Notes on the Production, Transmission, and Reception of the Major Works of Ahmad al-Buni," *Journal of Arabic and Islamic Studies* 12 (2012): 81–143.

by influential scholars of the medieval period such as Abu Hamid al-Ghazali (d. 1111) and Muhyi al-din b. ‘Arabi (d. 1240).[36] A similar phenomenon is witnessed in the works of the Kabbalah around the twelfth and thirteenth centuries, where Hebrew script embodies cosmic and occult properties.[37] In addition to highlighting the significance of the letters, many of the esoteric treatises incorporate diagrams where script and geometric shapes intertwine (discussed in Chapters 3 and 4). Such literary evidence complements the material significance of script, highlighting that script in its visual form, irrespective of its verbal content, was viewed in certain medieval societies as prophylactic, magical, and imbued with esoteric meanings.

Historical and Social Background

The twelfth and thirteenth centuries in the Islamicate world were a period of intense political fragmentation, diversity, experimentation, and innovation. Towards the end of the eleventh century and at the beginning of the twelfth, the atrophying Great Seljuq Empire in Iran (1038–1194) resulted in Seljuq polities attaining autonomous control in regions of Iraq, Syria, and Anatolia. These independent Turkish dynasties ruled as the Seljuqs of Rum (1087–1307; based in Anatolia as a result of the Battle of Manzikert in 1071), the Artuqids (1102–1409; ruling in Hisn Kayfa, Diyarbakir, Mayyafariqin and Mardin), and the Zangids (1127–1251; in Mosul and Syria).[38] The dynasties are labelled

[36] Saif, “From *Ghāyat al-ḥakīm,*” 317–26.

[37] Marla Segol, *Word and Image in Medieval Kabbalah* (New York: Palgrave Macmillan US, 2012).

[38] A.C.S. Peacock, “The Great Age of the Seljuqs,” in *Court and Cosmos: The Great Age of the Seljuqs*, ed. Sheila Blair, Deniz Beyazit, Martina Rugiadi, and A. C. S. Peacock (New York: Metropolitan Museum of Art, 2016), 15–24.

by scholars as "Seljuq successor states," as they are outposts of the Great Seljuq Empire and mimic its governance structures.[39] Whilst emerging from the Great Seljuq Empire, the Seljuq successor states developed identities independent of their ancestral empire in Iran, where linguistic demographics, local traditions and craftsmanship of the eastern Mediterranean, and political alliances with Christian kingdoms, fostered unique political and cultural entities. The fragmentary nature of the dynasties also led to a number of minor states ruled by independent *atabeg*s (governors), such as Badr al-Din Lu'lu' (r. 1222–1259; in Mosul), and more significantly, the Ayyubid dynasty (1174–1260; in Syria and Egypt), both emerging from Zangid political structures.

Jazira—the likely production site of the *Kitāb al-diryāq*—is situated in present-day northern Iraq, eastern Turkey, and north-eastern Syria. Nestled between the Tigris and Euphrates rivers, the region was governed by Seljuq successor states (Artuqids, Zangids) that were in constant contention with the forces of the Byzantine Empire and the Latin Crusaders.[40] The proximity of several political entities in the region, combined with the local population of the Jazira, resulted in a diverse mix of religions, languages, and ethnic traditions. Languages such as Aramaic, Kurdish, and Armenian remained active, alongside Greek, Persian and Arabic.[41] Islam was the religion of the governing bodies,

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[39] Carole Hillenbrand, "The History of the Jazira, 1100–1250: A Short Introduction," in *The Art of Syria and the Jazira, 1100-1250*, Oxford Studies in Islamic Art 1, ed. Julian Raby (Oxford and New York: Oxford University Press, 1985), 11.

[40] For a comprehensive discussion of this topic, see Estelle Whelan, *The Public Figure: Political Iconography in Medieval Mesopotamia* (London: Melisende, 2006), 1–6.

[41] Lorenz Korn, "Art and Architecture of the Artuqid Courts," in *Court Cultures in the Muslim World, Seventh to Nineteenth centuries*, ed. Albrecht Fuess and Jan-Peter Hartung (New York: Routledge, 2011), 387; and Rachel Ward, "Evidence for a School of Painting at the Artuqid Court," in *The Art of Syria and the Jazira, 1100-1250,* ed. Julian Raby (Oxford: Oxford University Press, 1985), 84.

but Christianity prevailed amongst the inhabitants, with the Syriac Church and monasteries playing an important role.[42] Despite the minor status of the Turkish dynasties and the volatile political climate of the region—or rather, due to these factors—the rulers heavily invested in the patronage of an urban building program and the development of a visual repertoire as a means to assimilate and assert their power.[43] The location of the Jazira within the artistic, cultural, and political climate of the eastern Mediterranean therefore serves as a vital backdrop in this dissertation (see also Methodology).

One of the defining characteristics of the Jazira (and neighboring regions) during the twelfth and thirteenth centuries is the presence of classical knowledge—either through "survival" or as a conscious "revival"—in art, architecture, and intellectual culture.[44] The classicizing motifs are apparent in architectural revetements and decoration, often as spolia, as well as in coins where antique portraits are adapted in Jaziran coins (see Chapter 5). The impact of classical knowledge is also prominent in arts of the book from the twelfth and thirteenth centuries that are dominated by themes of scientific and encyclopaedic knowledge. Figural illustrations and textual content borrowed and adapted Late Antique knowledge sources, such as seen in the Arabic illustrated treatises of the *De Materia Medica* (*On Medicinal Substances*) of Dioscorides (40–90 AD); and the *Kitāb fī maʿrifat al-ḥiyal al-handasīya* (*Book of the Knowledge of*

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[42] Korn, "Art and Architecture," 387.

[43] Whelan, *The Public Figure*, 41–9.

[44] The argument of "revival" is put forth in Terry Allen, *A Classical Revival in Islamic Architecture* (Wiesbaden: L.Reichert, 1986). On the other hand, "survival" is discussed by Yasser Tabbaa, "Survivals and Archaisms in the Architecture of Northern Syria, ca. 1080–ca.1150," *Muqarnas* 10 (1993): 29–41. For a discussion of this, see also Julian Raby, "Nur Al-Din, the Qastal al-Shu'aybiyya, and the 'Classical Revival,'" *Muqarnas* 21 (2004): 289–310.

Mechanical Devices) of al-Jazari (d. 1206) whose work illustrates a strong affiliation with classical treatises on mechanics.[45] The large number of illustrated copies and the courtly investment in the arts of the books is also suggestive of a school of painting at the Artuqid court.[46] In addition to Late Antique knowledge sources, the period also witnesses illustrations of encyclopaedic treatises, such as the *Rasā'il Ikhwān al-Ṣafā'* (*Epistles of the Brethren of Purity*; discussed in Chapter 3), and the *'Ajā'ib al-makhlūqat* (*Wonders of Creation*; discussed in Chapters 2 and 6) that expanded the boundaries of "scientific" knowledge, including within its remit cosmological and magical worldviews.[47] The *Kitāb al-diryāq* seamlessly integrates within this milieu: the treatise is the earliest Arabic work on this topic, likely deriving from the Late Antique intellectual tradition (see Chapter 1).[48] At the same time, the manuscript falls within the category of "scientific" knowledge that is characteristic of this period. The world of Late Antiquity and its adaptation thus become an important component in discussions about visual and cultural knowledge in medieval Jazira (see also Methodology).

The period of the twelfth and thirteenth centuries is characterized by innovations and experimentation in the arts of the Islamic world. The impetus towards novelty has been attributed to expanding patronage, increased geographic mobility, and political

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[45] For Late Antique influences in the arts of the book, see Kurt Weitzmann, "Greek Sources of Islamic Scientific Illustration," *Archaeologica Orientalia in Memoriam Ernst Herzfeld*, ed. George Miles (Locust Valley: J. J. Augustin, 1952), 244–66; see also Eva Hoffman, "The Beginnings of the Illustrated Arabic Book: An Intersection between Art and Scholarship," *Muqarnas* 17 (2000): 37–52.

[46] See this argument in Ward, "Evidence," 69–84.

[47] Hoffman, "The Beginnings," 37–8. See also Persis Berlekamp, *Wonder, Image, and Cosmos in Medieval Islam* (New Haven: Yale University Press, 2011).

[48] Jaclynne Kerner, "Art in the Name of Science: Illustrated Paintings of the Kitab al-Diryaq" in *Arab Painting: Text and Image in Illustrated Arabic Manuscripts*, ed. Anna Contadini (Leiden: Brill, 2010), 25–39; Oya Pancaroğlu, "Socializing Medicine: Illustrations of the *Kitāb al-diryāq*," *Muqarnas* 18 (2001): 155.

rivalries characterized by the "Sunni Revival" (term used by scholars to denote the rise of Sunni dynasties, after having defeated the Shi'i polities). The rise of social practices, such as that of magic, are rarely discussed in relation to artistic innovations. In other words, magical and occult practices may have also likely contributed towards visual experimentation. Magic, as a belief system, seamlessly integrates itself within the society and the courtly milieu, not isolated from religious tensions, political warfare, or mystical practices. In fact, one of the earliest magic-medicinal bowls is inscribed with the name of the Zangid ruler, Nur al-Din Zangi (r. 1146–1174),[49] highlighting the patronage of magical healing and protection at the court level (see Chapter 4). Given the nature of intellectual patronage at the Artuqid court, defined by treatises on automata, mechanical contrivances, star charts and constellations,[50] and the proliferation of astrological imagery in public spaces and luxury wares in Jazira, [51] manuscripts on astral magic (entwined with astronomy/astrology) and occult thought would have likely circulated in courtly spaces. Dynastic penchant for magic is mirrored across social classes. Magic is also a palatable medium enabling society to respond to social concerns in medieval Jazira. For instance, along with political instability, natural conditions such as eclipses, earthquakes, famine, and plagues, were significant causes of societal distress.[52] Snake and scorpion bites were also a major hazard ailing the region, reflected not only through its recognition in

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[49] Nasser D. Khalili Collection of Islamic Art, London (MTW 1443)

[50] Anna Contadini, "Ayyubid Illustrated Manuscripts and their North Jaziran and Abbasid Neighbours," in *Ayyubid Jerusalem, The Holy City in Context, 1187-1250*, ed. Robert Hillenbrand and Sylvia Auld (London: Altajir Trust, 2009), 188.

[51] Ward, "Evidence," 69–84; Whelan, *The Public Figure*.

[52] Canby, "Astrology," 198–9.

literature (such as the *Kitāb al-diryāq* and writings on toxicology), but also on portable objects (in particular, magic-medicinal bowls).[53] As such, evidence reveals that magic was practiced as a means of protection from disasters and as a way of healing the body. Examples of such practices include amulets, seals, talismans, and magic-medicinal bowls, used for healing against serpent and scorpion bites, fever, and the evil eye (see Chapters 3 and 4). The use of animal images as a means to protect against the dangers of that animal, that is, sympathetic magic, was also heavily employed in city gates, fortifications, entrances to mosques, and even inside the mosques, such as at the Great Mosque of Damascus (see Chapter 5).[54] Scholars suggest that the proliferation of mythical and fantastic animals in the region's visual repertoire signifies societal need for protective elements.[55] Incorporating this multifaceted domain of magic as an integral component of the society's social fabric will help shed light on new ways for the study and interpretation of innovations and experimentations characteristic of artistic practices in this period.

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[53] According to Emilie Savage-Smith, fifty-nine magic-medicinal bowls dated to the twelfth and thirteenth centuries mention bites of snakes (54 times), scorpions (56 times), and mad dogs (59 times). See Peter Pormann and Emilie Savage-Smith, *Medieval Islamic Medicine* (Washington, D.C: Georgetown University Press, 2007), 152–3.

[54] The Great Mosque of Damascus is said to have images of spiders, snakes, and scorpions. See Flood, "Image Against Nature," 149–151; for such images on city gates and fortifications in medieval Jazira, see Persis Berlekamp, "Symmetry, Sympathy, and Sensation: Talismanic Efficacy and Slippery Iconographies in Early Thirteenth-Century Iraq, Syria, and Anatolia," *Representations* 133 (2016): 59–109.

[55] For mythical and fantastic animals in architecture, see Gonnella, "Columns," 103–20; and Flood, "Image Against Nature," 143–66. For such representation in manuscripts, see Berlekamp, *Wonder, Image and Cosmos.*

Theoretical Framework and Methodology

Script patterns, the focus of this dissertation, operate in the interstices of the "word" and "image" dialectic. While the graphic element of script includes visual and tactile components that allow them to signify as verbal utterances, the varied planar orientations of the words (that is, the script patterns) enforce a visual reading. The script patterns are therefore an "image" first, and "word" only subsequently. The use of script in a multidirectional manner disrupts the conventional linear representation of script, transforming "word" into an "image" that is likely to be grasped before the text is read. The pattern thus makes dormant, or at least secondary, the underlying verbal message carried by the script.[56] Insofar as they embody and potentially communicate meaning of some sort in themselves, script patterns—in their conflation of visual, graphic, and verbal elements—squarely fit within the genre of "diagrams." Like the script patterns, diagrams privilege the "image," although they can include both word and image components. Studies on diagrammatic images (discussed below) illustrate the significant role of visual and graphic elements in knowledge production, processes, and their added semantic value—all of which inform the study of script patterns and their reception in this dissertation.

A diagram is defined as "an illustrative figure which, without representing the exact appearance of an object, gives an outline or general scheme of it, so as to exhibit

[56] For a review of the dialogue and contention between word and image, see W. J. T. Mitchell, "Word and Image," in *Critical Terms for Art History,* 2nd ed*.,* ed. Richard Shiff and Robert S. Nelson (Chicago: University of Chicago Press, 2003), 51–61. For script as image, see also Jeffrey Hamburger, "The Iconicity of Script," *Word and Image* 27, no. 3 (2011): 251; and the essays in Brigitte Bedos-Rezak and Jeffrey Hamburger, eds., *Sign and Design: Script as Image in a Cross-Cultural Perspective* (300–1600 CE) (Cambridge: Harvard University Press, 2016).

the shape and relations of its various parts."[57] Two elements from this dictionary definition are of significance: the diagram as a representation, and the diagram as a set of relations. Charles Sanders Peirce, the nineteenth-century philosopher and semiotician pioneering the study of diagrams, emphasizes these two aspects of diagrams wherein the formal structure of relations serves as signs within the context of knowledge production.[58] A diagram (or an image) as a representation of the natural world or of a concept is also advocated by the celebrated art historian Ernst Gombrich.[59] Like Peirce, Gombrich views diagrammatic structures as a set of schema, the underlying geometric figures of an image that are not static or fixed in their representation; rather, their meanings continually evolve and are contingent on the beholder's gaze.[60] In addition to the sense of ongoing experimentation that characterizes diagrams, Peirce regards the diagram as a site of cognitive activity. The diagrams neatly package information and clarify concepts, allowing the mind to think through complex ideas. Diagram as a mental representation is a key element in Peirce's writings, where the diagrammatic image is often understood as logically possible rather than existentially real.[61] Recent studies continue to affirm the interaction of point, line, and plane, as spaces of movement, action,

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[57] *Oxford English Dictionary*, s.v. "diagram," accessed July 23, 2021, https://www-oed-com.ezproxy.library.uvic.ca/

[58] See the summary of Peirce's "The Icon, Index, and Symbol," by Fernando de Toro, "The Icon, The Index and the Symbol According to Peirce," in *Theatre Semiotics: Text and Staging in Modern Theatre*, trans. John Lewis (Toronto: University of Toronto Press, 1995), 73–6.

[59] Ernst Gombrich, *Art and Illusion: A Study in the Psychology of Pictorial Representation* (Princeton: Princeton University Press, 2000), 110–11, 359–92.

[60] For diagrams as "representation" in the works of Peirce, Gombrich, and others, see Kamini Vellodi, "Diagram: Deleuze's Augmentation of a Topical Notion," *Word and Image* 34.4 (2018): 299–301.

[61] Vellodi, "Diagram," 301.

and intellectual activity—in fact, cognition is itself articulated as a spatially-oriented movement.[62] Diagrams become part of the "extended mind" for both the creator and the viewer.[63] So much so that diagrams can be harnessed to visualize the invisible (but intelligible) worlds, ideas, and concepts.[64] The diagrammatic image is thus representational in the broadest sense of the word.

The surge in the study of diagrams is indicated by the introduction of the term "diagrammatology," by scholars such as W.J.T Mitchell and Frederick Stjernfelt.[65] Building on the representational nature of diagram, Mitchell argues that diagrams are a visualization of forms underlying literary materials. For him, the diagrammatic "form is always intertwined with concrete, sensible reality."[66] As such, diagrammatology involves comprehending the underlying logic behind the formal structure of the image—one that is representational. For Stjernfelt, the formal structure of the diagram is connected to an iconographic system. Thus, all diagrams represent something, even "that which-cannot-be-depicted."[67] The representational nature of diagrams, however, is challenged by the French philosopher, Gilles Deleuze, who focuses on the transformative and affective

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[62] Sybille Krämer, "'The Mind's Eye': Visualizing the Non-visual and the 'Epistemology of the Line,'" in *Image and Imaging in Philosophy, Science and the Arts*, ed. Richard Heinrich, Elisabeth Nemeth, Wolfram Pichler and David Wagner (Frankfurt: De Gruyter, 2011), 277.

[63] Andy Clark and David Chalmers, "The Extended Mind," *Analysis* 58 (1998): 10–23. See also Andy Clark, "Pressing the Flesh: A Tension in the Study of the Embodied, Embedded Mind?" *Philosophy and Phenomenological Research* Vol. LXXVI, No. 1 (2008): 37–59.

[64] Krämer, "'The Mind's Eye,'" 280–1.

[65] See W.J.T. Mitchell, "Diagrammatology," *Critical Inquiry* (1981): 622–33; and Frederik Stjernfelt, *Diagrammatology: An Investigation on the Borderlines of Phenomenology, Ontology, and Semiotics* (Heidelberg: Springer, 2007).

[66] Vellodi, "Diagram," 302.

[67] Vellodi, "Diagram," 303.

nature of the diagrammatic image.[68] Defying an ordered system of communication, Deleuze explicates the diagrammatic image as one that exhibits new relations and can be better understood as maps or processes. Rather than a representation, the diagrammatic image "constructs" new realities that push beyond iconographic systems of meaning-making. For Deleuze, "the crucial thing about diagrams is their transformational character. To map a situation is not to show it more clearly, but to change it."[69] These transformational images are termed "diagrams of sensations" as they are better understood and experienced though the senses. Cognition and intelligibility are obviated in favor of direct sensory comprehension of the images, termed by Deleuze as "transcendental empiricism."[70]

Considering the applied design elements of diagrams, Johanna Drucker notes the resistance to incorporating practical considerations in scholarship, "as if the knowledge of hand and eye, embodied intelligence, and applied skills were somehow not theoretical."[71] Drucker emphasizes the hermeneutics of diagrammatic images, paying special attention to graphic arrangements as contributors of semantic value.[72] Diagrams are not neutral entities; they employ visual tools (lines, shapes, script) to convey meanings. Akin to Peirce's theoretical model, studies relating to information visualization corroborate that

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[68] For a cohesive articulation of Deleuze and the diagrammatic image, see Vellodi, "Diagram." See also Jakub Zbedik, *Deleuze and the Diagram: Aesthetic Threads in Visual Organization* (London: Bloomsbury, 2014).

[69] Vellodi, "Diagram," 300.

[70] Vellodi, "Diagram," 300, 305–6.

[71] Johanna Drucker, "Diagrammatic Writing," *New Formations* (2013): 86.

[72] Drucker, "Diagrammatic Writing," 90.

the diagram has the capacity to encapsulate abstract ideas.[73] By condensing information, a diagram is able to present the "essence" of an idea rather than a detailed exposition.[74] Diagrams are thus a much more effective means of communicating information, in terms of their speed and compact nature.[75] The choice of visual tools and their spatial arrangement within a diagram can also significantly affect one's perception of the image. The Gestalt laws—a series of rules for pattern perception—highlight how the viewer may perceive the different visual tools employed in diagrams.[76] For instance, straight lines or ribbons of colour between entities indicate relationship and connectedness between the component parts; and creating a symmetrical diagram allows the viewer to perceive the image as complete and holistic.[77] Most importantly, closed contours, such as a square or a circle, delineate an independent object—one of the most powerful organizing principles.[78]

As in Deleuze's argument, practical considerations of diagrams often eschew a representational outlook; rather, diagrams are seen as performative spaces that "work." That is, they participate in the production of knowledge by expressing ideas

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[73] Lee Brasseur, *Visualizing Technical Information: A Cultural Critique* (Amityville, N.Y: Baywood Pub, 2003), 71–2; See also Rudolf Arnheim, *Visual Thinking* (Berkeley: University of California Press, 1969).

[74] Brasseur, *Visualizing*, 72.

[75] Brasseur, *Visualizing*, 86.

[76] Colin Ware, *Information Visualization: Perception for Design,* 3rd edition (Boston: Elsevier Science and Technology, 2013), 181.

[77] Ware, *Information*, 183–5.

[78] Ware, *Information*, 186.

relationally.[79] Drucker pushes the boundaries of Peirce's "logic" of the diagrammatic image, illustrating that the formal structure of relations expressed in diagrams creates meaning through their visual-spatial arrangement (poetics) and through the arguments that are encoded in or emerge from the structure (rhetoric).[80] The numerous epistemologies of diagrammatic images discussed thus far—ideas of representation, relations, cognition, and sensibility—are all integral to the study of script patterns in this dissertation. In fact, many of the theories described also find strong resonances in medieval Arabic philosophy, literature, and aesthetics (see also Chapter 6).

The meanings created by diagrammatic images are analyzed primarily though the case of the *Kitāb al-diryāq* manuscript. Given the relevance of Late Antique visual and knowledge sources during the twelfth and thirteenth centuries in the Jazira and neighboring regions (see Historical and Social Background), the study expands the temporal focus of the materials considered for comparative purposes. The chapters on magic (Chapters 3–5), in particular, discuss objects and ideas prevalent in Late Antiquity with a focus on the region of the eastern Mediterranean.[81] Late Antiquity is defined as the period between the fourth and the eighth centuries. This "long Late Antiquity" as a temporal context is suited for the present study as it acknowledges the diversity of pagan,

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[79] Drucker, "Diagrammatic Writing," 84. For diagrams as "working objects" see also Martin Gardner, *Logic Machines and Diagrams* (New York: McGraw Hill, 1958); and John Bender and Michael Marrinan, *The Culture of Diagram* (Stanford: Stanford University Press, 2020), 33.

[80] Drucker, "Diagrammatic Writing," 89–99.

[81] For eastern Mediterranean as an independent category in Late Antiquity, see Averil Cameron, "The Eastern Mediterranean – a Region in Ferment," in *The Mediterranean World in Late Antiquity, 395–700 AD* (New York: Routledge, 2012), 168–90; and Sean Kingsley and Michael Decker, eds., *Economy and Exchange in the East Mediterranean during Late Antiquity* (Oxford: Oxbow Books, 2015). For a continuation of this category in the medieval period, see Catherine Holmes, "Introduction," in *Byzantines, Latins, and Turks in the Eastern Mediterranean World after 1150*, eds., Jonathan Harris, Catherine Holmes, and Eugenia Russell (Oxford: Oxford University Press, 2012), 1–29.

Jewish, Christian, and Muslim spaces and objects, as well as the visual and intellectual crossovers between them. [82] The study also adopts the terminology of the "medieval" period to refer to the time between the eighth and the thirteenth centuries. In the Islamic context, this period is largely defined by the political rule of the Abbasid dynasty (750–1258) centered in Baghdad. However, as discussed in the section above, the medieval period included several Sunni and Shi'i dynasties (see Historical and Social Background), some of which acknowledged the nominal power of the Abbasids.[83] Despite the fragmentation of political power, there was immense cross-cultural activity during this time demonstrated by the increased mobility of ideas, resources, and skilled artisans, particularly in the twelfth and thirteenth centuries. The mid-thirteenth century is marked by the Mongol conquests of the Islamic lands, events that changed the political, cultural, and artistic landscape of the regions, thus constituting the end date for this study.[84] Together with the mobility of resources and the relative cultural unity in the pre-Mongol period, the fragmentary nature of magical materials—many of which are also difficult to date and to establish the provenance of—has allowed this study to consider objects from a wide geographic base, identifying materials from eastern (Iran) and western (Egypt) hemispheres that employ geometric script patterns. The transcultural environment of the

[82] For a discussion of the "long Late Antiquity" see Averil Cameron, "The 'Long' Late Antiquity: A Late Twentieth-Century Model," in *Classics in Progress: Essays on Ancient Greece and Rome*, ed. T.P. Wiseman (Oxford: Oxford University Press, 2006), 165–91. See also Arnold Marcone, "A Long Late Antiquity? Considerations of a Controversial Periodization," *Journal of Late Antiquity* 1 (2008): 4–19. With respect to artistic exchanges in Late Antiquity see Eva Hoffman, ed., *Late Antique and Medieval Art of the Mediterranean World* (Malden, MA: Blackwell, 2007).

[83] For a brief overview, see Finbarr Barry Flood and Gülru Neçipoğlu, eds., "'City-States' and the Later Baghdad Caliphates," in *A Companion to Islamic Art and Architecture* (Hoboken, NJ: Wiley Blackwell, 2017), 301–6.

[84] For art in the Islamic world related to the Mongols, see Yuka Kadoi, *Islamic Chinoiserie: The Art of Mongol Iran* (Edinburgh: Edinburgh University Press, 2009).

eastern Mediterranean region, especially in the medieval period, offers a richer base of materials from which to ascertain image meaning and functionality.[85] As such, the chapters examine objects from cultures outside of the Islamic world as well, such as the Greco-Egyptian tradition and the neighboring Byzantine world. Chapters 3 and 4, dealing with magical objects, also briefly venture into the early modern period related to Islamic magic, often when there is a lack of medieval Islamic sources and magical contexts. Doing so illustrates the continued association of the geometric shape within the magical environment.

Materials for study are identified through fieldwork in museums, libraries, archival, and photographic collections, serving as the primary sources for the dissertation. I employ art-historical methodologies, particularly formal and stylistic analysis of calligraphic patterns, including script style, letterforms (their elongation, shortening, curving, or bending), handling of ligatures, thickness of strokes, height, colours, placement, positioning, and the use of space. The discussions consider ornamental additions to the script, level of legibility, and visibility, paying special attention to artistic decisions that value the aesthetic over the legible (or vice-versa). The formation of the geometric shape, and the interplay between script and geometry are key factors in tracing the development of the pattern. The study classifies the materials using a typological approach: the objects selected for each chapter are materials where the geometric shape is the most dominant. The variant typologies in each chapter are the result of the disparities that the materials exhibit, and therefore the classifications differ between each chapter.

[85] See especially Eva Hoffman and Scott Redford, "Transculturation in the Eastern Mediterranean," in *A Companion to Islamic Art and Architecture*, eds. Finbarr Barry Flood and Gülru Neçipoğlu (Hoboken, NJ: Wiley Blackwell, 2017), 405–30.

This heuristic methodology allows for a study of the materials in a way that does not conform to strict disciplinary categories, political boundaries, or fluctuating time periods; rather, the materials are gathered solely based on their display of the geometric pattern and the broad definition of magic posited above. In doing so, the analysis is more concerned with the visual reading and experience of the shape, taking into account rituals and practices that accompany the object. The discussions closely trace the ways in which shape (and script) interact with other magical vocabulary, the magical context (that is, the function of the object or the content of the inscriptions), the role of the practitioner or magician (if available), the user's sensory engagement with the material, and the relationship of the individual or society with the object. The analysis allows one to comprehend the many ways in which power and meanings were ascribed to the object—magical or otherwise—and the role of the geometric shape and script in this process. This data is further examined in light of contemporaneous sources in Arabic that present writings on intellectual thought and magical beliefs.

Literature Review

The dissertation draws on a wide variety of literature relating to Arabic script, magic in medieval Islam, and the historical and cultural contexts of the Middle East and the Mediterranean region prior to the Mongol conquests. The literature is categorized into three main sections: i) approaches to Arabic script and script patterns; ii) magic: objects, intellectual culture, textual sources; iii) historical and cultural context.

i) Approaches to Arabic script and script patterns: This section includes literature where Arabic script and its patterned depictions are the central focus, including in the realm of monumental art and scientific manuscripts. The dissertation draws on studies that look beyond positivist readings of calligraphy; for instance, calligraphy as a means to political identity is illustrated by Irene Bierman's *Writing Signs: The Fatimid Public Text,*[86] Yasser Tabbaa's *The Transformation of Islamic Art during the Sunni Revival,*[87] and Alain George's *The Rise of Islamic Calligraphy*.[88] Marcus Milwright's study on *The Dome of the Rock and its Umayyad Mosaic Inscriptions* highlights the social and political context which engendered the first instance of depicting entire Qur'anic verses on an architectural monument.[89] Similarly, scholars have also articulated the meaning of geometrical patterns in the visual sphere, interpreting the images as symbolic representations of Islamic theological schools such as advocated by Yasser Tabbaa.[90] Gülru Necipoğlu, discussing geometric patterns in the fifteenth century,[91] and Samer Akkach's book entitled *Cosmology and Architecture in Premodern Islam: An Architectural Reading of Mystical Ideas*,[92] on the other hand, argue for connotations of mystical thought in architectural design and decoration.

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[86] Irene Bierman, *Writing Signs: The Fatimid Public Text* (Berkeley: University of California Press, 1998).

[87] Tabbaa, *The Transformation*.

[88] Alain George, *The Rise of Islamic Calligraphy* (London: Saqi, 2010).

[89] Milwright, *The Dome of the Rock*.

[90] Tabbaa, *The Transformation*.

[91] Necipoğlu, *The Topkapı Scroll*.

[92] Samer Akkach, *Cosmology and Architecture in Premodern Islam: An Architectural Reading of Mystical Ideas* (Albany: State University of New York Press, 2005).

The experimental nature of the Arabic script and its patterned appearances are particularly prominent in the monumental arts. The dissertation takes advantage of the numerous studies on medieval Islamic architecture that have published photographs or have produced drawings of architectural inscriptions. In examining the stylistic aspects of scripts, the research relies on the copious drawings of architectural inscriptions reproduced by scholars such as K.A.C Creswell.[93] Sheila Blair's *The Monumental Inscriptions from Early Islamic Iran and Transoxiana*[94] has been an invaluable resource in examining inscriptions from eastern Iran. For Late Antique architecture, Sean Leatherbury's book entitled *Inscribing Faith in Late Antiquity: Between Reading and Seeing*[95] and Ernst Kitzinger's "The threshold of the Holy Shrine: Observations on floor mosaics at Antioch and Bethlehem"[96] discuss the materials and iconography through the lens of visuality and ritual contexts.

Scientific manuscripts, particularly in the field of medicine, copiously employ diagrammatic images using Arabic script. Not only is there an inextricable relationship between medieval magic and medicine, the *Kitāb al-diryāq*, the primary case study for this dissertation, is itself a treatise on medicine and pharmacology. Several influential publications by Emilie Savage-Smith and Peter Pormann have informed this dissertation:

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[93] K. A. C. Creswell, Marguerite Gautier-van Berchem, and Félix Hernández, *Early Muslim Architecture* (Oxford: Clarendon Press, 1969).

[94] Sheila Blair, *The Monumental Inscriptions from Early Islamic Iran and Transoxiana* (Leiden: Brill, 1992).

[95] Leatherbury, *Inscribing Faith*.

[96] Ernst Kitzinger, "The Threshold of the Holy Shrine: Observations on Floor Mosaics at Antioch and Bethlehem," in *Studies in Late Antique, Byzantine and Medieval Western Art* (London: Pindar Press, 2002), 244–59.

Savage-Smith and Pormann's book, *Medieval Islamic Medicine*;[97] Pormann's article on the "The Alexandrian Summary of Galen's On the Sects for Beginners: Commentary or Abridgement?";[98] and Savage-Smith's book chapter on "Ibn Baklarish in the Arabic Tradition of Synonymatic Texts and Tabular Presentations."[99] These publications together provide an overview on Galenic medicine, knowledge production in the Late Antique schools of Alexandria, and diagrams as pedagogical and didactic tools.

ii) Magic: Objects, Intellectual Culture, and Textual Sources. Many of the script patterns surveyed and examined relate to the category of magical objects. Secondary sources on magic include an extensive catalogue of objects from the Khalili collection, *Science, Tools and Magic* edited by Francis Maddison, Emilie Savage-Smith, Ralph H. Pinder-Wilson, and Tim Stanley.[100] Savage-Smith's, *Magic and Divination in Early Islam*, an edited collection of essays, focuses on the use and practice of magic in Islam.[101] Venetia Porter discusses magical elements of script in her article "The Use of Arabic Script in Magic" and her catalogue *Arabic and Persian Seals and Amulets at the British Museum*.[102] The intersection of script and geometry is particularly prevalent in block-printed amulets examined in Karl Schaefer's book entitled *Enigmatic Charms: Medieval*

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[97] Pormann and Savage-Smith, *Medieval Islamic Medicine*.

[98] Peter Pormann, "The Alexandrian Summary of Galen's On the Sects for Beginners: Commentary or Abridgement?" *Bulletin of the Institute of Classical Studies* 47 (2004): 11–33.

[99] Savage-Smith, "Ibn Baklarish," 113–29.

[100] Maddison et al., *Science, Tools, and Magic*.

[101] Emilie Savage-Smith, ed., *Magic and Divination in Early Islam* (Aldershot: Ashgate, 2004).

[102] Porter, "The Use of the Arabic Script in Magic," 131–40; and Venetia Porter, *Arabic and Persian Seals and Amulets in the British Museum* (London: British Museum Press, 2011).

Arabic Block Printed Amulets in American and European Libraries and Museums.[103] Detailed studies on individual objects such as Anne Regourd's "A Magic Mirror in the Louvre" and Annette Ittig's "A Talismanic Bowl" provide contextual analyses that outline the functional role of the object within magical practices of divination and healing.[104]

Objects from the medieval Islamic period are studied in conjunction with Late Antique and Byzantine materials relating to magical practices. Joseph Naveh and Shaul Shaked's catalogue on incantation bowls, *Amulets and Magic Bowls: Aramaic Incantations of Late Antiquity*[105] and Campbell Bonner's *Studies in Magical Amulets, Chiefly Graeco-Egyptian*[106] illustrate that elements of syncretism and geometric script patterns are extensively associated with supernatural healing and protection in the Late Antique period. Several studies related to Late Antiquity corroborate the porous boundaries between magic and Christianity particularly in the realm of visual culture. Ildar Garipzanov's *Graphic Signs of Authority in Late Antiquity and the Early Middle Ages, 300-900*;[107] Theodore de Bruyn's book entitled *Making Amulets Christian:*

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[103] Karl Schaefer, *Enigmatic Charms: Medieval Arabic Block Printed Amulets in American and European Libraries and Museums* (Leiden: Brill, 2006).

[104] Anne Regourd, "A Magic Mirror in the Louvre and the Additional Observations on the Use of Magic Mirrors in Contemporary Yemen," in *Word of God, Art of Man*, ed. Fahmida Suleman (Oxford: Oxford University Press in association with the Institute of Ismaili Studies, 2010), 135–56; and Annette Ittig, "A Talismanic Bowl," *Annales Islamologiques*, no. 18 (1982): 79–94.

[105] Joseph Naveh and Shaul Shaked, *Amulets and Magic Bowls: Aramaic Incantations of Late Antiquity* (Jerusalem: Magnes Press, The Hebrew University, 1985).

[106] Campbell Bonner, *Studies in Magical Amulets, Chiefly Graeco-Egyptian* (Ann Arbor: University of Michigan Press, 1950).

[107] Garipzanov, *Graphic Signs*.

Artefacts, Scribes, and Contexts,[108] and Alicia Walker's book chapter "A Reconsideration of Early Byzantine Magic Rings,"[109] all highlight the movement of symbols, practices, and rituals from magical into religious spheres. Byzantine art historians, Henry Maguire and Gary Vikan, bring to fore everyday objects embedded with magical symbols, such as the geometric ornaments in Byzantine textiles.[110] The emphasis on closed circular contours and the power of script is furthered in Alicia Walker's article, "Meaningful Mingling: Classicizing Imagery and Islamicizing Script in a Byzantine Bowl,"[111] which concentrates on exchanges of magical beliefs and practices between the Byzantine and Islamic worlds.

Magic is a significant category in medieval intellectual writings, and is predominant in literature on natural philosophy and esoteric thought. Liana Saif's research, "From *Ghāyat al-ḥakīm* to *Shams al-maʿārif*: Ways of Knowing and Paths of Power in Medieval Islam" argues for an evolution of magic over time, one based on celestial influences in the ninth and tenth centuries, to that of mystical thought in the twelfth and thirteenth centuries.[112] Saif's research on epistemological paradigms stresses the dominant role of occult thought and astral magic, paradigms that affect visual and material culture, and society's interactions with them. Noah Gardiner highlights the

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[108] Theodore De Bruyn, *Making Amulets Christian: Artefacts, Scribes, and Contexts* (Oxford: Oxford University Press, 2017).

[109] Walker, "A Reconsideration," 149–64.

[110] Henry Maguire, "Garments Pleasing to God: The Significance of Domestic Textile Designs in the Early Byzantine Period," *Dumbarton Oaks Papers* 44 (1990): 215–224; and Gary Vikan, "Art, Medicine, and Magic in Early Byzantium," *Dumbarton Oaks Papers* 38 (1984): 65–86.

[111] Walker, "Meaningful Mingling," 44–6.

[112] Saif, "From *Ghāyat al-ḥakīm,*" 297–345.

practices and reception of magical treatises, bringing together astral influences and the power of the Arabic script in his article "Stars and Saints: The Esotericist Astrology of the Sufi Occultist Ahmad al-Buni."[113] Liana Saif and Persis Berlekamp effectively discuss the prevalence of Neoplatonic thought that permeated across medieval Islamicate societies, and its impact in the realm of the religion, philosophy, magic, visual culture, and image perception.[114]

Primary textual sources that dwell on magic (and intersecting fields) include the tenth-century *Rasā'il Ikhwān al-ṣafā'* (Epistles of the Brethren of Purity).[115] Authored by an anonymous group, the encyclopaedic treatise includes epistles on arithmetic, geometry, composition and the arts, music, and magic, that have been instrumental for this dissertation. The Neoplatonic framework of the Ikhwan al-Safa' acknowledges the domain of magic and astral influences as a core component in their philosophical outlook. The treatise has been widely influential, impacting later writings on the topic of magic. This dissertation incorporates knowledge on geometry and ontological paradigms from several epistles of the *Ikhwān al-ṣafā'*. Ibn Wahshiyya's (d. 930) oeuvre spans the range of magic, astrology, agriculture, and medicine. Ibn Wahshiyya's works relevant to this study include the *Kitāb al-Summum* (Book of Poisons), discussing the many varieties of poison, including poisons through sight and

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[113] Noah Gardiner, "Stars and Saints: The Esotericist Astrology of the Sufi Occultist Ahmad al-Buni," *Magic, Ritual, and Witchcraft* 12, no. 1 (2017): 39–65.

[114] Saif, *The Arabic Influences*; and Berlekamp, *Wonder, Image, and Cosmos*.

[115] Ikhwan al-Safa', *On Composition and the Arts: An Arabic Critical Edition and English Translation of Epistle 6–8,* ed. and trans. Nader El-Bizri and Godefroid de Callataÿ (Oxford: Oxford University Press in association with the Institute of Ismaili Studies, 2011); *On Music: An Arabic Critical Edition and English Translation of Epistle 5,* ed. and trans. Owen Wright; *On Magic: An Arabic Critical Edition and English Translation of Epistle 52a,* trans. Godefroid de Callataÿ and Bruno Halflants; *On Arithmetic and Geometry: An Arabic Critical Edition and English Translation of Epistle 1&2,* ed. and trans. Nader El-Bizri (2012).

sound.[116] During this period, the surge of astral magic in tandem with the Sufi strand of Islam, coalesce in the thirteenth-century manual, *Shams al-Ma'ārif* (The Great Sun of Gnoses), attributed to al-Buni.[117] The prominence of this treatise is attested by its widespread popularity and the practical nature of the content, giving credence to the occult properties of letters and words of the Arabic alphabet. Through an engagement and critical reading of prevalent primary sources, the aim is to unveil the complex and multivalent narratives that are embedded within the script patterns under study.

iii) Historical and Cultural Context. Lastly, literature on the political, cultural, and artistic environment of the Jazira and the wider Middle East in the twelfth and thirteenth centuries provides a contextual setting for this dissertation. Estelle Whelan[118] and Carole Hillenbrand[119] are two of the few scholars who discuss the political, religious and cultural context of the Artuqids and Zangids. A more extensive discussion can be found in Hillenbrand's book, *A Muslim Principality in Crusader Times: The Early Artuqid State.*[120] In the art-historical literature, the main exception to an absence of prominent publications that discuss holistically the art of the two dynasties, is an edited volume of

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[116] Ibn Wahshiyya, *Medieval Arabic Toxicology: The Book of Poisons of Ibn Wahshiyya and its Relation to Early Indian and Greek Texts*, ed. Martin Levy (Philadelphia: American Philosophical Society, 1966).

[117] Ahmad ibn 'Ali al-Buni, *Kitāb Shams al-Ma'ārif al-Kubra wa-Latā'if al-'Awārif* (Cairo: Maktab al-Arab, 1874).

[118] Whelan, *The Public Figure*.

[119] Carol Hillenbrand, "The Establishment of Artuqid Power in Diyar Bakr in the Twelfth Century," *Studia Islamica* LIV (1981): 129-153.

[120] Carol Hillenbrand, *A Muslim Principality in Crusader Times: The Early Artuqid State* (Leiden: The Netherlands Historical and Archaeological Institute for the Near East in Istanbul, 1990).

essays by Julian Raby entitled *The Art of Syria and the Jazira, 1100-1250*[121] and a book chapter by Lorenz Korn, "Art and Architecture of the Artuqid courts."[122] Rachel Ward attempts to give credence to a school of painting at the Artuqid court through her analysis of the manuscript paintings.[123] Manuscripts from the Jazira region and the challenging question of regional attribution is highlighted by Anna Contadini in a book chapter entitled "Ayyubid Illustrated Manuscripts and their North Jaziran and 'Abbasid Neighbours."[124] Oya Pancaroğlu explores the role of medicine through her article delineating the historical and cultural context of the paintings in the *Kitāb al-diryāq*.[125] The realm of numismatics of the Seljuq successor states has been studied in detail in the scholarship of Spengler and Sayles, in their two-volume book *Turkoman Figural Bronze Coins and Their Iconography*, detailing the presence of Late Antique traditions.[126] Julian Raby insightfully assembles metalwork of Mosul (an important city for the production of metalwork in the Jazira), illustrating its connections with book arts of the period.[127] While scholarship of art of the Artuqids, Zangids, and Ayyubids is disparate, much can

[121] Julian Raby, ed., *The Art of Syria and the Jazira, 1100-1250* (Oxford and New York: Oxford University Press, 1985).

[122] Korn, "Art and Architecture of the Artuqid Courts."

[123] Ward, "Evidence for a School of Painting."

[124] Contadini, "Ayyubid Illustrated Manuscripts."

[125] Pancaroğlu, "Socializing Medicine."

[126] William Spengler and Wayne G. Sayles, *Turkoman Figural Bronze Coins and their Iconography* (Lodi, Wis: Clio's Cabinet, 1992).

[127] Julian Raby, "The Principle of Parsimony and the Problem of the 'Mosul School of Metalwork,'" in *Metalwork and Material Culture in the Islamic World: Art, Craft and Text,* ed. Venetia Porter and Mariam Rosser-Owen (London: I.B. Tauris, 2012), 11–85.

be gleaned from individual studies that examine particular artworks from the region. The studies are especially valuable as this research project pursues a cross-media trajectory.

Chapter Outline

The chapters in this dissertation are bookended by the case study of the *Kitāb al-diryāq* manuscript (595 AH/1199 AD, BnF arabe 2964) and its geometric script patterns. The first chapter provides a detailed overview of the textual components of the manuscript by examining the variety of calligraphic styles and their patterned appearances within the folios. The pages of the *Kitāb al-diryāq* employ bold, angular script interspersed with fine, cursive script. This visual interplay is enhanced by the colours (black, red, blue) utilized for the script. Within the folios, information is relayed through a number of geometric configurations, ranging from simple tabular presentations to intricate and complex quadratic and circular designs—all of which incorporate copious amounts of script. The chapter categorizes the diagrams into three primary modes of representation: the tabular format; quadratic compositions; and circular arrangements. The descriptions of these geometric patterns are paired with the verbal content presented within the script. The assortment and sophistication of calligraphic formations in the *Kitāb al-diryāq* makes the manuscript a fitting subject of study in assessing the prevalence of script-based patterns and their meanings in the medieval context.

The richly illustrated *Kitāb al-diryāq* falls within the genre of "scientific" manuscripts in Arabic that includes illustrated and unillustrated copies produced in the medieval period. While complex geometric script patterns are uncommon in illustrated copies, the many unillustrated Arabic "scientific" manuscripts employ tabular, circular,

and polygonal patterns that visually resonate with the *Kitāb al-diryāq* diagrams. Chapter 2 surveys the diagrams in the scientific manuscript tradition between the eleventh and thirteenth centuries, the time period for the production of the *Kitāb al-diryāq*. In doing so, the chapter discusses the semantic role of the geometrical diagrams, their cultural meanings, as well as the nomenclature employed to label them.

Geometric script patterns are predominant in material culture connected with magical and occult themes, the focus of Chapters 3 and 4. Chapter 3 examines in detail the quadratic form, its representations, and its meanings in material and textual sources. The geometric device—with or without script—is employed in the form of enclosures, grids, and complex diagrams, deemed efficacious by its makers and its beholders. The materials under discussion include amulets and seals, as well as horoscopes, magic squares, and diagrams in mystical treatises. The chapter incorporates textual sources and considers the objects as part of an embodied experience, including the role of sight, sound, and touch as part of the magical process. The range of materials considered for this chapter is wide in terms of time and geography; however, the focus is on the region of the eastern Mediterranean prior to the thirteenth century. Chapter 4 follows suit by examining circular compositions and their role in materials related to magic. The chapter examines circular forms as framing devices. The representation of the circular form in concentric circles highlights spatial relationships, while the pattern of radial lines illustrates a non-hierarchical mechanism of visual division. This chapter considers Aramaic incantation bowls and Coptic textiles, to divination bowls as well as Late Antique and esoteric thought. Both chapters (3 and 4) highlight that the patterns featured in the *Kitāb al-diryāq* are pervasive in materials related to magic and the occult sciences.

In Chapter 5, the discussion centers around materials within the public realm, in particular, architectural decoration and coinage. Particularly in the medieval eastern Mediterranean, apotropaia within the urban fabric and in coins were prevalent. Real and mythical animals, spolia, and foreign or antique script forms comprise some of the elements that embody the magical. By examining examples from medieval Islamic regions, the chapter demonstrates the presence and persistence of geometric script patterns in public spaces and its possible meanings, closely intertwining with magical ideas of protection and healing. Chapter 6 returns to the geometric script patterns in the *Kitāb al-diryāq*. The materials presented in Chapters 2–5 highlight themes of healing, wonder, divinity, cosmos, supernatural, death, and *baraka* (blessings)—all of which hinge on making invisible knowledge palpable. Chapter 6 builds on these ideas to illustrate that the *Kitāb al-diryāq* patterns must be understood within the complex socio-cultural medieval context where imbrications in science, religion, and magical knowledge are evident. The chapter analyses the *Kitāb al-diryāq* diagrams as multivalent images by interpreting them as visual metaphors; objects of wonder; magical and talismanic figures; and as images capable of supernatural healing. The Conclusion synthesizes the patterns and themes surveyed within this dissertation to highlight that script, shape, and pattern are important tools that play a vital role in visualizing knowledge and disseminating knowledge.

Chapter 1 The Diagrams of the *Kitāb al-diryāq* (BnF arabe 2964)

The *Kitāb al-diryāq* (*The Book of the Theriac/Antidotes*; BnF arabe 2964) is a large-scale (37 x 29 cm) illustrated and illuminated manuscript in Arabic that presents the theriac—medicinal recipes primarily for the healing of snake venom.[1] Identified as one of the earliest extant illustrated manuscripts of the Islamicate world, its figural illustrations, calligraphy, illumination, and geometric diagrams, operate in concert to present a historical biography of antique physicians, narrative anecdotes, and pharmacological content.[2] The manuscript states in its colophon that it was completed in 595 AH/1199 AD and has been attributed to the region of north Jazira, likely Mosul, based on the stylistic analysis of its paintings.[3] In its opening pages,[4] the treatise attributes its authorship to Galen (d. c. 199 AD), the famed Greek physician of Pergamon, highlighting Yahya al-Nahwi of Alexandria as the commentator. The full title reads:

> The book of theriac (*kitāb al-diryāq*) of the eminent philosopher/physician (*al-ḥākim al-fāḍil*) Galen, from the summary (*jawāmi'*) of the first discourse (*al-*

[1] "Theriake (theriac) was the name given to the kind of antidote which was specially meant to counteract the bites of venomous creatures, serpents, scorpions, spiders, bees, mad dogs, and the like." For origins and history of the theriac, see Gilbert Watson, *Theriac and Mithridatium: A Study in Therapeutics* (London: Wellcome Historical Medical Library, 1966), 4.

[2] For an extended discussion on figural illustrations see Bishr Farès, *Le livre de la thériaque, manuscrit arabe à peintures de la fin du XIIe siècle, conservé à la Bibliothèque nationale de Paris* (Cairo: l'Institut français d'archéologie orientale, 1953); Oya Pancaroğlu, "Socializing Medicine: Illustrations of the *Kitāb al-diryāq*," *Muqarnas* 18 (2001): 155–172. For its biographical form (*adab*), see Jaclynne Kerner, "Art in the Name of Science: Illustrated Paintings of the Kitab al-Diryaq" in *Arab Painting: Text and Image in Illustrated Arabic Manuscripts*, ed. Anna Contadini (Leiden: Brill, 2010), 25–39.

[3] Richard Ettinghausen, *Arab Painting* (Geneva: Skira, 1962), 86, 92. Prior attribution to Iran made by A. S. Melikian-Chirvani, "Trois manuscrits de l'Iran seldjoukide," *Arts Asiatiques* 16 (1967): 3-51; and to the Baghdad school by Bishr Farès. Recent scholarship on the manuscript by Kerner and Pancaroğlu affirm the Jaziran provenance.

[4] The manuscript, as it stands, has been reassembled in a manner that does not match the original order. The 74 pages (37 leaves) of the manuscript will be referred to in this dissertation according to their current pagination. For a history of the provenance of the object, see Marie Geneviève Guesdon, "History of the Manuscript and Codicological Presentation," in *Kitāb al-diryāq (Thériaque de Paris), édition en facsimilé du manuscrit arabe 2964 de la BnF* (Sansepolcro: Aboca Museum edizioni, 2008–9), 15–9.

> *maqāla al-ulla*) of Galen's book of electuaries (*kitāb Jālīnūs fi'l-ma'jūnāt*) with the commentary (*bi-tafsīr*) of Yahya al-Nahwi the Alexandrian, God's mercy upon him, and he is the wise falcon (*al-bāz al-ashhab*) and the wondrous phoenix (*al-'anqa' al-mughrib*).

This title, with the attribution to Galen and Yahya al-Nahwi is inscribed twice: once in the opening pages where it is distributed between the upper and lower bands of the folio and within the central rosette (page 33); and a second time, framing the folios that feature the physicians' portraits (pages 34, 31, 32; see the respective pages in Appendix).[5] The two iterations indicate the scribe's desire to elevate the status of the book through its connection with Galen and the famed Greek tradition of medicine. The scribe also inserts the name of Yahya al-Nahwi al-Iskandari as the commentator. In contemporary scholarship, the identity of Yahya al-Nahwi is disputed, and a number of individuals are identified including John the Grammarian/Grammatikos and John Philoponus (c. 570).[6] Nevertheless, his association with Alexandria—explicitly stated—serves to elevate the status of the manuscript, identifying the knowledge base as emerging from the Late Antique schools of Alexandria. The title specifies the work as a compendium or summary (*jawāmi'*) of Galen's treatise; a tradition ubiquitous in the medieval Islamic period where several *jawāmi'* of Galenic treatises were produced (see Chapter 2). While many such summaries were translated into Arabic by Hunayn ibn Ishaq (d. 873), many copies

[5] In the second iteration of the title, the wording is slightly altered. The title describes the work as a summary (*jawāmi'*) of Galen's discourse on electuaries, rather than the book of the theriac. The work is presented as an extract from the electuary of the theriac from Galen's treatise, as commented on by Yahya al-Nahwi. This alteration suggests a clarification of the content by the scribe.

[6] See Max Meyerhof, "Joannes Grammatikos (Philoponos) von Alexandrien und die Arabische medizin," *Mitteilungen des Deutschen Institut für Ägyptische Alterumskunde in Kairo* 2 (1932): 1–21; and also Jaclynne J. Kerner, "Art in the Name of Science: Illustrated Manuscripts of the *Kitāb al-diryāq*" (PhD diss., New York University, 2004), 54–60.

remain anonymous, and some have even been attributed to Yahya al-Nahwi.[7] In this light, the content and structure of the *Kitāb al-diryāq* may benefit from an investigation into the Late Antique Galenic tradition and its revival in the medieval Islamic manuscript tradition. Scholars examining the *Kitāb al-diryāq* have interpreted the material as magico-mystical,[8] cosmological,[9] literary in form,[10] and even purely scientific in nature,[11] attributing a pseudo-Galenic label to the corpus. The Paris *Kitāb al-diryāq* appears to be the earliest dated manuscript of its kind, with subsequent iterations leading up to the eighteenth century.[12] An original composition could have been produced in Greek in the fifth or sixth-century Alexandria, in Syriac in the sixth or seventh-century upper Mesopotamia, in Arabic in the eighth- or ninth-century Baghdad at the height of the translation movement, or the current copy might even be an original composition by the scribe of the Paris treatise.[13]

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[7] See Emilie Savage-Smith, "Galen's Lost Ophthalmology and the Summaria Alexandrinorum," *Bulletin of the Institute of Classical Studies* 45 (2002): 121.

[8] Meyerhof, "Joannes Grammatikos," 1–21.

[9] Pancaroğlu, "Socializing Medicine," 163.

[10] Kerner, "Art in the Name," in *Arab Painting*, 26.

[11] Françoise Micheau, "The Medicinal Value of the Book of Theriac," in *Kitāb al-diryāq (Thériaque de Paris), édition en facsimilé du manuscrit arabe 2964 de la BnF* (Sansepolcro: Aboca Museum edizioni, 2008-2009), 67.

[12] In addition to the Paris manuscript, five additional copies are known. One of them is illustrated (Vienna, Österreichische Nationalbibliothek, A.F. 10) and has been dated to mid-thirteenth century. Four are unillustrated, three of which are combined with Shanaq al-Hindi's *Kitāb al-sumum (Book of Poisons)*. They are dated as follows: 1224–5 (private collection), 1585 (St. Petersburg MS Dorn 123), 1586 (Cairo MS 166 Tibb), 1738 (Beirut, Bibliothéque orientale). Kerner, "Art in the Name," in *Arab Painting*, 26–7.

[13] Kerner suggests that the *Kitāb al-diryāq* was an original Arabic composition with no antecedents in other languages. Kerner, "Art in the Name," in *Arab Painting*, 29.

The name of the scribe and illustrator is mentioned in the manuscript, namely Muhammad b. Abu'l-Fath 'Abd al-Wahid, and this illustrated copy was made for the library of Imam Abu'l-Fath Mahmud, presumably the nephew of the copyist. Like the reiterations of the title, the scribe's name is presented three times in the treatise: in the opening folios, the frontispiece, and the colophon (Appendix, pages 4 and 35, 36 and 37, and 73). These iterations and the opulence of the manuscript suggest that the treatise was produced for an upper-class family with likely Shi'i inclinations and used in a private setting.[14] The use of fine calligraphic scripts and the style of the figural illustrations point to a northern Jaziran provenance, to which some extant manuscripts can be attributed.[15] However, the vocalization of the text as well as the use of Persian names for the drugs also suggest that the scribe might have been from the region of Greater Iran (see Appendix, page 65 where several drug names have been translated from Persian).[16] Through this treatise, the scribe was visibly bolstering his identity while exhibiting his diverse skillset to his patron/s.

The subject of the manuscript is the theriac, the universal antidote. The treatise commences by introducing the lives of nine physicians of antiquity instrumental in the development of the theriac, along with their portraits: Andromachus the Elder (d. 68 AD;

[14] Pancaroğlu, "Socializing Medicine," 165–6.

[15] Some manuscripts attributed to the Jazira include: Abd al-Rahman al-Sufi's *Kitāb ṣuwar al-kawākib al-thābita* dated 566/1171 (Bodleian, Hunt. 212); Isma'il ibn al-Razzaz al-Jazari's *Kitāb fī ma'rifat al-ḥiyal al-handasiyya*, dated 602/1206 (Topkapi Sarai Library, Ahmet III 3472); and al-Hariri's *Maqāmāt* (BnF arabe 3929) among others. See Anna Contadini, "Ayyubid Illustrated Manuscripts and their North Jaziran and Abbasid Neighbours," in *Ayyubid Jerusalem: The Holy City in Context 1187–1250*, eds. Robert Hillenbrand and Sylvia Auld (London: Altajir Trust, 2009), 179–94; and also Rachel Ward, "Evidence for a School of Painting at the Artuqid Court," in *The Art of Syria and the Jazira, 1100–1250*, ed. Julian Raby (Oxford: Oxford University Press, 1985), 69–84.

[16] Micheau, "The Medicinal Value," 61.

Andrumakhus), Herakleides (Abraqlidis), Philagrios (Aflaguras), Proklos (Afriqlis), Pythagoras (Yuyaguras), Marinos (d. ca. 130 AD; Marinus), Magnus of Emessa (Maghnis al-Homsi), Andromachus the Younger (fl. 1st C AD; Andrumakhus al-Qarib al-'Ahd), and Galen (fl. 2nd C AD; Jalinus).[17] Several pages are then devoted to each physician, their biography, anecdotal narratives, ingredients of their theriac, and the individual and combined benefits of the drugs used in the recipes (see Appendix for an overview of the text). Generally, figural illustrations accompany the anecdotes and the geometric compositions visualize the theriacal recipe. Each successive physician's recipe builds on the former through incorporating additional ingredients. The diagrammatic compositions visually reveal this comprehensiveness of the theriac as the pages progress (see table 1, summary of diagrams). As such, the treatise not only presents recipes but explicates a history of the development of the theriac[18]—both through the structure of the treatise and visually, through the geometric compositions. Following the recipes, the manuscript details the varieties of snakes and herbals, accompanied by illustrations, as well as a series of extra-theriacal recipes that utilize the snake flesh (*maṭbūkh*). As Jaclynne Kerner has illustrated, the treatise takes the form of a biographical dictionary and can be seen as oscillating between the domains of literature and scientific writings.[19] This chapter will focus specifically on the diagrammatic compositions featured in the manuscript, including their variant shapes, the utilization of script, and their distribution

[17] The names of the physicians conform to their most frequently used spelling.

[18] Kerner, "Art in the Name," 28.

[19] For a detailed discussion of the manuscript in the form of a biographical dictionary see Kerner, PhD diss., 123–44. For the genre of biographies, see Michael Cooperson, *Classical Arabic Biography: The Heirs of the Prophets in the Age of al-Ma'mūn* (Cambridge: Cambridge University Press, 2000).

between prose text and narrative illustration. The discussion will detail the use of tables, quadratic shapes, and circular schemata incorporated in the *Kitāb al-diryāq*. Notably, the use of Arabic script and its interplay with the geometric compositions will be examined at length.

1.1 Script Styles

Within the Paris *Kitāb al-diryāq*, the scribe utilizes a variety of script styles that are distributed within the linear prose text, in tabular formats, and as part of the diagrams. The aesthetic and design elements of the page as well as the content inform the choice of style incorporated by the scribe. Three main styles of Arabic script can be identified: a) style 1: small-scale cursive script, *naskh*; b) style 2: angular script, New Style[20]; c) style 3: angular script, New Style, with extended vertical segments (*hastae*). The consistent execution of the script styles indicates a single hand, corroborating the title pages that mention the name of a single scribe for the treatise.[21] Using these styles, the scribe experiments with the colours, thickness of strokes, length of script, ornamental backgrounds, and writing planes to produce a series of pages worthy of admiration for their artistic merit. More than the figural illustrations, the variety of calligraphic styles and patterns employed suggests the significance of the carefully constructed pages, each designed to individually serve as a work of art.

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[20] The term New Style is as identified by François Déroche, *The Abbasid Tradition: Qur'ans of the 8th to the 10th Centuries AD*, The Nasser D. Khalili Collection of Islamic Art, v. 1 (London: Nour Foundation in association with Azimuth Editions and Oxford University Press, 1992). Other terms for such a script include: semi-Kufic, Eastern Kufic, broken cursive. For more on this style, see also Yasser Tabbaa, "The Transformation of Arabic Writing: Part I, Qur'ānic Calligraphy," *Ars Orientalis* 21 (1991): 124–30.

[21] The name of the scribe and the script styles mentioned do not include the marginal and in-text annotations that were added later. See end of section for a note on the annotations.

Some observations can be made about the calligraphy and the manner in which it is featured throughout the treatise. The first is the use of diacritics and the insertion of vowels for both the cursive and angular scripts. In addition to the comprehensive orthographic system, the scribe inserts individual letters in small legible script directly above or below the letter on several occasions, acknowledging the fact that the angular script is challenging to read. For instance, the first line on page 11 depicts red angular script in style 3 with blue ink used to clarify letters *kāf*, *hā'*, and *'ayn* (fig. 1.1). As will be illustrated below, such practices were not unique to the *Kitāb al-diryāq* and contemporaneous examples exhibit identical features of clarification and vocalization (section 1.2). The second most conspicuous feature is the planar variations of the text; that is, the lines of text are not confined to a horizontal, linear plane, and are commonly witnessed on the vertical and diagonal planes. There is a seamless transition from a horizontal to a vertical plane, particularly towards the end of the text box when the scribe must accommodate the required text. This change in planar direction is characteristic of the angular scripts and is deliberately discreet to maintain the integrity of the aesthetic (see for instance, fig. 1.2, last row). Furthermore, the text also appears upside down (relative to the page's vertical orientation), predominant in diagrammatic representations to accentuate the aesthetic. Individual examples of such will be noted in the relevant compositions below. Third, complete sentences and even individual words can be a combination of two script styles, generally part angular, part cursive. Such instances are commonly found in captions, where the first row features two lines and two styles of script (page 14, fig. 1.16a). In diagram 4 (fig. 1.17), the drug illustrated on the bottom left vertex only presents the first four letters of *usṭūkhūdūs* (lavender) in the angular, with the

remainder of the word inscribed in cursive directly beneath. Several examples of partial sentences and words are scattered throughout the treatise.

The fourth observation concerns the ornamental components of the angular script, added to enhance the opulence and visuality of the text. The most prominent of these is the interlacing visible on the vertical *lām-alif* combination and the horizontal *kāf-lām* interface (seen in fig. 1.1, and fig. 1.4, row two respectively). The visual decoration through script is augmented with elements of repetition that serve the aesthetic goal rather than communicating a verbal message. The repetition of the words *min kul* (fig. 1.2, row one) and *ila* (fig. 1.4, last row) illustrates this ornamental role of script disseminated amidst prose text. Further examples abound in the geometric compositions discussed below. Proportion, balance, and symmetry within the text box and page setting are key features that enhance the aesthetic quality of the treatise. The common technique of *mashq* is used to accommodate text, elongating as necessary to simulate geometric planes and edges. The letter *kāf* stands out for its visual variance, with its vertical stem depicted as a straight line and on other occasions presented as a curved stroke (examples of both variants seen in fig. 1.1). Fifth, the scribe has inserted additional pseudo-letters mimicking the angular script, particularly in the upper third of the text box. This addition affects the overall visual effect indicating the scribe's attention to assist with maintaining balance and visual symmetry. Taking the form of a *lām-alif* combination or straight-line segments, the scribe adds these layers to preserve the aesthetic integrity of the manuscript (fig. 1.1 illustrates two such additions at either end of the text box). This particular filler motif is ubiquitous throughout the treatise, particularly used in conjunction with style 3. More intriguing is the example on page 61, where the angular red script is symmetrically

enhanced by the addition of three letters, *alif-lām-alif*, featured towards the end of the text box (fig. 1.3). The vertical stem accompanied by an interlace stem mirrors the visual form of the letters presented at the start of the sentence, and bears no verbal meaning. The beginning of the cursive script in the panel below also bears no relationship to the angular text in discussion, suggesting that the letters were primarily added to serve an ornamental function.

Along with the main calligraphic styles present in the manuscript, a series of annotations illustrate signs of continued usage over time. At least two annotations in the margins inscribe aphorisms attributed to Imam al-Mufid (fig. 1.4). These annotations are in Arabic and judging by the writing style, appear to be contemporaneous with the date of production. If so, the annotations may be attributed to the famed Shaykh al-Mufid (d. 1022), a Shi‘a theologian from Baghdad. More conspicuous are the extensive annotations in Persian throughout the manuscript, with a suggested date between sixteenth and seventeenth centuries.[22]

1.2 Calligraphy Comparatives

The opulent use of angular script in this manner is most reminiscent of Qur’an manuscripts in the so-called New Style, typically dated to the eleventh and twelfth centuries. Manuscripts in New Style scripts exhibit significant ornamental additions to the letterforms, highlighting the prevalence of visual experimentation on paper as a ubiquitous practice.[23] A cursory comparison with François Déroche’s table on the New

[22] Guesdon, “History of the Manuscript,” 15.

[23] Déroche, *The Abbasid Tradition*, 134–5. See for instance cat. 93 illustrating the many variations of the letter *kāf* and interlacing motifs on *lām-’alif.*

Style script (NS.1) reveals that the letterforms in the *Kitāb al-diryāq* align closely with contemporaneous forms.[24] The visual and ornamental enhancements to the script in the treatise then appear to be concurrent with the practice of inscribing the text, rather than stark innovations. For instance, a Qur'an manuscript with Persian commentary (BL Or 6573), from the eleventh or twelfth century features the angular style and cursive script in varied planar orientations with ornamental alterations to letter forms (fig. 1.5). A near-identical example of *Kitāb al-diryāq* style 3, complete with background foliage and vine scrolls, and pseudo-script elements, is illustrated in a manuscript of the *Munājāt* (*Confidential Talks,* MET 1995.324, fig. 1.6) of 'Ali ibn Abi Talib, one of the rightly-guided caliphs and the first Imam in Shi'a Islam. This script, however, is present only in the frontispiece representing the title, and as the opening *basmala* (the invocation). The folios of the *Munājāt* feature the word *ilaha* successively in red script, drawing visual attention and augmenting the repetitive nature of the treatise. Due to the close stylistic similarity of the ornamental script in the two manuscripts, scholars have also dated the *Munājāt* to c.1200.[25] Apart from the script, both treatises are affiliated with Shi'ism; the *Munājāt* for its content, and the theriac in its patronage. While this comparison does not allow for any conclusions, it may be interesting to speculate about connections between ornamental script and esoteric trends prevalent in Shi'i thought.

Qur'an manuscripts of the New Style have also used script in conjunction with geometric enclosures. For instance, a thirteenth-century manuscript from Iraq or Iran,

[24] Déroche, *The Abbasid Tradition*, 136–7. Table VI details letterforms of the New Style.

[25] Sheila R. Canby et al., eds., *Court and Cosmos: The Great Age of the Seljuqs* (New York: Metropolitan Museum of Art, 2016), 286.

housed at the Chester Beatty Library (Is 1439) utilizes horizonal tabular rows within the main body of the Qur'anic manuscript as a way to distinguish between chapter title and content. Lavishly illuminated, with extensive use of gold throughout the treatise, this Qur'an manuscript is about the same size as the *Kitāb al-diryāq* and was likely commissioned for a mystical order.[26] Many such examples from this period highlight the variety of models present in manuscript illumination where script was utilized for extra-linguistic purposes: aesthetic pleasure; utility; or ritual function.[27] The pages of the *Kitāb al-diryāq*, discussed below, conform to a similar visual repertoire where the aesthetic setting of script overpowers the verbal meanings within the page.

1.3 Tabular Representations

The *Kitāb al-diryāq* utilizes a variety of tabular forms that break the visual monotony of prose text. The tables are configured for the type of information presented, incorporating a variety of styles and colour schemes to create a visually appealing page. Tables allow the scribe to compress large amounts of information into a compact space whilst making the material visually palatable to its users. They do not duplicate or explicate preceding content but present new information (see Chapter 2 for tables in scientific manuscripts). Such a mode of representation differs from that of quadratic or circular diagrams seen in this and other scientific manuscripts (see examples in Chapter 2) where the diagram serves to expound, sharpen, complement, and visualize the textual information presented

[26] The argument for a mystical order is suggested due to the use of "al-Sufi" as part of the illuminator's name. See Canby et al., eds., *Court and Cosmos*, 284.

[27] Other examples of Qur'an manuscripts include two copies at the Nasser D. Khalili Collection, QUR 89 and QUR 497.

prior to it. There are two main ways in which tables have been depicted in the *Kitāb al-diryāq*: narrow tabular columns; and diagonal writing in columns. The following section will demonstrate how both formats have been fully integrated within the text, each with a specific purpose.

1.3.1 Narrow Tabular Columns

Extending the horizontal width of the folio, the text panel is subdivided into a number of columns where information is compactly illustrated in individual cells. The script is laid out on a vertical plane in a legible cursive script (style 1). Generally, in scientific manuscripts this mode of layout is employed for delineating inventories and lists of information. In this treatise, such tabular columns have been utilized for: a) chronology of physicians; b) benefits of individual theriac recipes; and c) presentation of the recipe.

The first use of this table format is a chronological timeline of the nine physicians and includes their time (in years) as a disciple and as a teacher (fig. 1.7; see Appendix, page 24). Using two horizontal bands with twenty-nine columns each, the scribe allocates six cells to each physician's timeline. Gold rosettes flank the use of cursive script when space permits. The presence of repetitive information as the scribe iterates the number of years for each physician's various occupations makes the tabular format conducive to such an illustration. In a similar manner, the tabular format has been employed several times to present beneficial uses of the theriac recipes. For instance, page 10 (fig. 1.17, above Diagram 4) begins with an illustration of the sixteen uses (*manāfi'*) of Marinos' theriac, presented in sixteen columns. Unlike the previous example where the text is fragmented into two horizontal bands, each cell in the present illustration is a complete phrase. The number of columns is regulated to suit the content material. However, there

is a repetitive element reinforced by the scribe that reiterates the numerical component and the words "*yanfa' min* (useful for)" as though alluding to a rhyme or meter (see Appendix, page 10); the simple interchange of black and red ink within the cells in this case, visually emulates a rhythm (see Chapter 6 for poetry, poetics, and the theriac).

The use of a traditional tabular format is exploited in the presentation of recipes. This is particularly evident in examples where a large number of drugs are confined within a single row, such as in page 11, to illustrate the recipe of Marinos (fig. 1.8). Using three rows, the scribe has manipulated the width of the columns in each, to visualize the drugs and their respective proportions. Using narrow columns in the first row, the scribe uses cursive script on a vertical plane to incorporate eighteen drugs. Honey and the pastille are emboldened and inscribed in the angular, likely pointing to their significance in the process. The second row uses seven columns to form groupings of the drugs illustrated on the row above, using a repetitive phrase five times, with visual emphasis: "*min kul* (of each)." The third row beneath follows the preceding row in column number and width, delineating the numerical proportion for the cluster of drugs. The way in which the scribe has created relationships between groups of drugs and their weighted measures, while elegantly presented, is not conducive to a functional reading of the recipe (see Appendix, page 11 for one interpretation of this table reading). The lack of functional utility is furthered by a decorative pattern of interlacing above the horizontal ligature that connects the letters *kāf* and *lām*; a different interlacing pattern as the colours alternate between blue and red ink. Two columns flanking the end of the tabular structure vary in the rows they present, defying a strict adherence to conventional formats.

1.3.2 Diagonal Script in Columns

In a similar manner to the above representations, each row is divided into a number of columns, based on the types of information represented. In these cells, the script features on a diagonal plane. Each successive cell alternates the diagonal plane of representation, resulting in a chevron pattern across the entire row. The scribe uses this technique in angular and cursive scripts, with copious and limited data, and with narrow and wider columns, making it amenable to suit a large range of information. For instance, on page 16, the scribe has divided the row into four columns to provide a biographical timeline for the physician, Proklos (fig. 1.9). The information presented in these four cells does not necessarily lend itself to a tabular form; the scribe, however, attempts to synchronize the text within the four cells to illustrate a chevron pattern. The pattern divides the text elegantly, providing an undulating movement across the page. The presentation of information in a chevron pattern is not arbitrary, and only specific types of information are illustrated in this way. Almost all biographical timelines as they occur within the treatise appear in tabular columns; their visual patterns however, differ. For instance, the biography of Philagrios on page 13, uses four columns that repeat and emphasize a single word (fig. 1.4, last row). Such variations in design suggest a certain experimentation at play, perhaps dependent on spatial concerns and a responsiveness to visual dynamics of the page. However, there is consistency in the content that features in tables, as well as the use of a repetitive element that provides visual balance and maintains symmetry within the row(s). This consistency is also echoed in the verbal reading of the biographical tables that are read from left to right, rather than following the direction of the non-tabulated text (see Appendix, page 16).

The second type of information that incorporates diagonal script in a chevron pattern is in the illustration of drugs. For instance, page 9 exhibits three rows of simple drugs (*al-adawiyya al-mufrada*) in this manner, dispersed throughout the page (fig. 1.10). The latter part of the treatise presents eleven recipes of electuaries, separate from the theriac. The electuaries are unified by the addition of *maṭbūkh* or cooked snake flesh, constituting one of its core ingredients. The recipes here primarily highlight the drugs, obviating any weight measures and proportions seen in the theriac recipes. The use of tables and column divisions visually assists in identifying individual drugs for use in the electuaries. However, as the number of drugs for each electuary differs, the scribe has taken the liberty to further experiment with the visual mechanisms and patterns of representation. Moreover, as the number of drugs for each electuary is generally under twelve, the scribe retains spatial luxury to use the angular script, further accentuating the visual representation. On page 39, the first two electuaries are presented, each exhibiting ten drugs. Rather than a simple chevron, the rows of illustrated drugs are animated into geometric shapes using diagonal script, with the central cells differentiated through a change in colour, plane, and a heavily ornamented background (fig. 1.11). In both of the central blue cells in the second recipe, the scribe has utilized the horizontal and the vertical plane to accommodate the word. Even while the two recipes appear identical in the visual pattern, signs of experimentation are evident; for instance, the far-left cell on the top row of the first recipe is upended as compared to its counterpart in the second recipe. Such minor inconsistencies suggest that the scribe likely did not have a template, nor was this perhaps an exact copy of an earlier treatise. More likely is the case that the scribe sought to expand the boundaries of the available visual tools. This experimental

quality of visual care and aesthetic sensibility is manifested in the presentation of another electuary, located in the upper section of page 41 (fig. 1.12). In order to present this recipe requiring eleven drugs, the scribe has inserted a filler word as the first drug in the cell (Appendix, page 41). Two rows of six columns each then use diagonal script to create a chevron pattern and a series of three quadratic figures. Incorporating an even number of cells was instrumental in facilitating a symmetrical sensibility.

The entire manuscript is replete with tabular modes of representing information. This section has categorized the tables into two parts, based primarily on the visual effect produced by each of the modes. In the first part, the use of narrower columns generally accompanied by cursive script attempts to confine a larger set of data into digestible components. In the second part, the use of angular script in diagonal planes produces the effect of numerous patterns, privileging a design aesthetic over the dissemination of a factual list. However, these two modes are not mutually exclusive and the scribe at times has collated the two to present yet another image. The recipe of Andromachus the Younger on page 70, for instance, features the drugs in narrow columns, cursive script, and on a diagonal plane (fig. 1.13). The table also includes drugs inscribed in angular script, horizontal and vertical planes, and spread over more than one cell, presenting an image with large amounts of data in a most refined and elegant way. By choosing to retain the tabular format, the scribe has also endeavoured to be consistent with the other recipes to illustrate the ingredients for this final theriac recipe.

1.4 Quadrilateral Diagrams

The manuscript as it currently stands has seven quadrilateral figures (see table 1, summary of diagrams), each of which illustrates the ingredients required for a recipe, as well as the independent and combined benefits of the drugs. As the ingredients for each subsequent recipe increase, the diagram includes a greater number of component parts. By presenting the herbals in this way, that is, by including individual benefits of each drug, the treatise also serves as a pharmacological manual of simple drugs. The medieval Arabic intellectual tradition of discussing simple drugs, such as seen with the medical treatises of Ibn Butlan (d. 1063) and Ibn Baklarish (fl. 12th C), generally pairs the simple drugs with their benefits in a tabular format (see Chapter 2). The scribe of the Paris *Kitāb al-diryāq* follows this intellectual tradition (if indeed we take this treatise to be an original composition), which has the added advantage of expanding his audience base—the treatise represents an accumulation of knowledge on general health, rather than serving primarily as a manual for healing snake poisons. The geometric diagrams hence illustrate the simple ingredients, and the benefits of each of the individual ingredients that come together to compose the antidote. While tabular arrangements in the depictions of simple drugs are common in contemporaneous Arabic manuscripts, visually illustrating compound medicine (the theriac) in geometric patterns is rather unusual, such as in the *Kitāb al-diryāq*. For instance, the treatise of *Aqrābādhīn al-kabīr* (*The Great Formulary*) of Ibn al-Tilmidh (d. 1154–65) copied in 1277–8 (BL Or 8293) features a series of compound recipes such as pastilles, pills, electuaries, syrups and salves, all of which are depicted in a linear manner, devoid of any geometric compositions. This section examines the seven quadrilateral diagrams of the *Kitāb al-diryāq* in detail.

1.4.1 Diagram 1: Recipe of Andromachus the Elder

The first recipe and quadrilateral composition in the manuscript is that of Andromachus the Elder (page 20; figs. 1.14 a, b, c, d; see Appendix, page 24 and 19 for Andromachus' discovery of laurel berries as an antidote). A large text panel with angular writing (style 3) in red ink precedes the diagram, serving as a caption for the figure: "five drugs (*adawiyya*) make up (*faṣārat*) this theriac (*hadhā al-diryāq*)." The diagram itself is depicted in the lower half of the folio, covering less than half the page. Confined within the margins of the folio, the composition takes the form of a rectangle with a wide framing border. Four layers of information are presented; each distinguished by its size, style, and colour. The first layer is the inclusion of the five ingredients, all of which are visually distinct; the four ingredients at either corner (myrrh, bitterwort, crepe ginger, laurel berries) are inscribed on a diagonal plane using a bold, angular script (style 2), and the fifth marks the center in gold, representing honey (see fig. 1.14d). The second layer is the individual benefits of the simple drugs inscribed along the inner border; the small size (style 1), black ink, and cursive style of inscription has visually relegated the significance of this layer, despite its inclusion of vowels and diacritical marks to facilitate reading. In the third layer, the scribe uses red script (style 2) to chart a diagonal path from each of the four vertices to the central honey. These paths indicate the benefits of each of the ingredient when combined with honey. For instance, the combination of laurel berries and honey is beneficial for the bite of a snake, while the mixture of crepe ginger and honey serve as an antidote for black bile (see fig. 1.14c for translation). Around the outer border, blue angular script (style 3) wraps around the central figure, marking the final layer. Each line segment of this border unites the two drugs that flank it with the central

medallion, honey. For instance, the upper horizontal border reads: “these three are used for persistent fever,” indicating myrrh, bitterwort, and honey. The other three follow suit.

The quadrilateral figure and the diagonal line segments are essential to the performance of script in this diagram; that is, the script conforms to the quadratic shape rather than to accommodate the reader. The four simple drugs on the vertices are not only diagonally inclined, but positioned in a way that commences from the outermost edge of the figure and directed towards the center. While myrrh and laurel berries are placed at an angle, they are relatively comprehensible when looking directly at the page. Bitterwort and crepe ginger, on the other hand, are inverted, making it challenging to decipher the text without turning the book around physically. The diagonal segments are inscribed in an identical manner; the two line segments following the latter two drugs are reversed as they make their way to the central medallion. The placement of script in this manner exhibits an invisible line that begins at the vertex and is visually led into the center. Had the scribe privileged legibility, the visual effect of the drugs converging into the center would not have been achieved. In a similar manner, the blue angular script around the border emulates the line segment, turning ninety degrees anti-clockwise at each intersection. As a result, the script along the bottom of the figure is upside down (relative to the page’s vertical orientation).

1.4.2 Diagram 2: Recipe of Herakleides

The second diagram presents the recipe of the physician Herakleides (page 18; figs. 1.15a, b, c) who, at twenty-five years of age, added four additional drugs to the esteemed theriac (*al-diryāq al-mansūb*) of Andromachus the Elder (Appendix, page 17). The panel

preceding the diagram is the largest text block on the page, highlighting a title of sorts for the diagram to follow. Inscribed in black angular script (style 3), the linguistic structure of this caption follows its precursor: "drugs of a compound nature (*adawiyya al-murakabba*) are (*faṣārat*) nine and they are …" Privileging style and design over legibility in navigating the constraints of space, the scribe has rendered only the first three words in the angular script, with the remainder compacted directly beneath in red—significantly smaller in size but maintaining the angular style.

The quadrilateral diagram is similar in conception to the first recipe; the figure in this case has become more square-like by increasing the length of the vertical edges. The horizontal edges of the shape follow the contours of the folio margins. The four vertices enclose four drugs. The outer border of the diagram features four additional drugs. The ninth ingredient, honey, is inscribed as the figure's central element. Notably, the four drugs inscribed on the vertices in Andromachus' recipe are not repeated around the vertices in Herakleides' recipe. The text between the two diagrams notes the second recipe as an "addition" (*ziyāda*) to the first, and one might expect that the four main drugs and their position within the diagram would remain static to illustrate the "addition" visually — that, however, is not the case. If we examine the two diagrams, both highlight in black the four drugs, with honey featured in the center. In the second figure, the top-right corner depicts myrrh in an identical manner, crepe ginger has moved its position, and the two bottom vertices depict new drugs (see figs. 1.14 and 1.15). Such reorganization might have been necessary considering the inner workings of the diagram, which seeks to form relationships between adjacently-placed drugs.

Diagram 2 also presents a slight variation from the first diagram, in terms of the relationships presented. Take for instance the diagonal script (blue angular; style 2) that runs from the vertex to the central medallion. The text in the first diagonal extends from myrrh (top-right) past the central circle, leading to Chinese cinnamon (bottom-left), reading: “these three [myrrh, honey, Chinese cinnamon] are beneficial for the bite of a black snake.” The second diagonal, on the other hand, is divided into two sentences noting the beneficial use of each of the drugs when combined with honey. Visually, the two diagonals look alike even though they refer to different combinations. The distinct relationships represented by the diagonals suggest the significance of the structural integrity of the figure, emphasized by the use of a single word prominently splayed across the figure. Additional relationships between the drugs are highlighted by line segments that run through the center of the circle (angular red; style 2); and by a series of eight lines in black cursive script (style 1) that form an octagon within the borders of the inner square. Examining the two diagrams suggests that while the content of the individual layers might be inconsistent in the relationships they represent, the visual form of the diagram is carefully maintained though symmetry, balance of text, and color coding.

1.4.3 Diagram 3: Recipe of Philagrios

The recipe diagram of Philagrios mimics closely its precursor, by arranging its ingredients and their applications in a similar manner (page 14; figs. 1.16a, b, c). The physician has added two additional ingredients to Herakleides’ recipe, with a total of eleven ingredients (Appendix, pages 13, 14, 15). The caption preceding the diagram

asserts this increase as well as the use of a syrup: "drugs of a compound nature (*adawiyya al-murakabba*) are (*faṣārat*) eleven drugs [mixed] within a syrup."[28] The scribe's experience with the preceding diagram (assuming that he composed them chronologically) has provided him with insights on areas of improvement—evident from the more consistent depiction of relationships between the various component drugs.

The first layer is composed of four ingredients displayed at each of the intersections, together with the addition of a central medallion. Visually, the four vertices are emphasized as the script is set amidst a background of vines and foliage, and include: myrrh, bitterwort, white pepper, and Chinese cinnamon. Compared to the two previous recipes, the four presented here exhibit a slight difference. Three of the four vertices position the script as radiating into the center of the diagram, consistent with the last two diagrams discussed; likely a minor error by the scribe, one of the drugs (bottom-right) is not oriented towards the center. The second layer is the incorporation of four diagonal segments that meet from the vertices to the center. Unlike the second diagram, the scribe appears consistent here with the four line segments, each of which illustrates the curative benefits of two combined drugs. The third layer is the remainder of the six drugs presented along the border adjoining the main drugs: crepe ginger, laurel berries, cinnamon, wild onion, vetch flour, and saffron. The fourth layer is the outer square border framing the figure. The four registers each discuss the benefits of a combination of four drugs (three drugs placed adjacent to and its combination with honey). The scribe remains consistent and mentions the benefits of four (*arba'*) drugs along the square's

[28] It should be noted that the scribe is inconsistent with the use of articles. In this case the compound nature is inscribed as *adawiyya al-murakabba* rather than *al-adawiyya al-murakabba.* It appears that this is a scribal error rather than a conscious attempt.

perimeter; however, the two vertical segments of the figure incorporate four drugs each, making it challenging to distinguish the drugs that the scribe is referencing. Given that the scribe was being spatially challenged in Herakleides' diagram to configure aesthetically the content within the central square, the scribe has expanded the diagram by including an outer border to illustrate the information. The central square of the diagram is more carefully constructed as well, with limited discrepancies between design and content, forming the fifth and sixth layers. The fifth layer is comprised of black cursive script that runs within the central square. Four diagonal line segments connecting two adjacent points on the square, forming what may be the diagonal lines of an octagon. These four lines describe the usefulness of three (*thalātha*) drugs (likely the two drugs adjacent to the beginning and end points of the diagonal line and the central medallion, honey). Four additional lines of script converge through the diagram's center. The two vertical lines draw on the benefits of two (*hadhān*) drugs, while the two horizontal segments explicate the curative qualities of three (*thalātha*) drugs. A sixth layer is also evident from the use of red cursive script within the central square. While four of these segments are tied to the four blue diagonals, two independent phrases are apparent along the upper and lower edges, both of which recount the usefulness of two (*hadhān*) ingredients from opposite ends of the diagram.

Together with collating the content, the scribe has paid equal (if not more) attention to the stylistic elements of both the script and the overall aesthetic. As with the previous diagram, considerable emphasis is placed on accentuating the geometric components in the quadratic figure. Visible through the elongation of the ligatures, particularly in the inner diagonal segments (layer 2) and the representation of additional

drugs (layer 3), the manipulation of script in this manner draws attention towards the visual figure. The geometricity is reinforced through patterns of symmetry, using the central axis as a point of reflection. Evident in the placement of drugs on the vertical border, the angular script inscribed in red is reflected on the opposite border as well as on the adjacent cell—horizontal and vertical symmetry. The symmetry in the horizontal border is made conspicuous through the addition of filler motifs in the upper third of the text box; the upper-most drug incorporating two U-shaped motifs to visually balance the inscription. The representation of this drug finds its counterpart reflected through the central axis in the lower end of the diagram; the latter illustrated with an internal symmetrical alignment using a U-shaped filler motif to mark its center. In this way, every component illustrated in the figure finds its representation along both axes.

There appears to be a clear progression from the second to the third diagram. Building on the structural composition of the "squares of opposition" and its variants seen in the scientific manuscripts such as the *Jawāmi*ʿ and in the *Tadhkira* (see Chapter 2), the scribe has aimed to illustrate as many relationships as possible, without compromising the integrity of the figure. The addition of the outer border and the spatial aesthetics of the inner square witness a clear development. Furthermore, the visual relationships become more coherent. For instance, in Herakleides' diagram, the four blue diagonal segments are inconsistent (that is, there is a combination of two and three drugs). The central octagonal also illustrates the benefits of three and four drugs. By contrast, a consistency of content is preserved in Philagrios' figure. The latter diagram is also visually augmented. Considerable attention has been paid to the reworking of the

inner square, the eight lines of black cursive script presenting an apparent allusion to an octagon—particularly considering the configurations of its precursor.

There are several missing folios in the Paris *Kitāb al-diryāq*, but subsequent iterations of the treatise narrate the biographical details and recipes of the physicians Proklos and Pythagoras that would have followed Philagrios' theriac. The diagrams that would have likely accompanied the physicians' recipes are also unavailable for study. However, Kerner's careful reading of a 1224–5 unillustrated *Kitāb al-diryāq*, sold at Sotheby's London in April 2002, provides details on their possible reconstruction in the Paris copy.[29] A partial discussion of the fourth physician, Proklos, is mentioned in the Paris copy. He introduces a compound drug into the theriac mixture: the *iqrāṣ al-asqīl* (scilla pastilles; see Appendix for a description of the recipe for the *iqrāṣ al-asqīl*, page 16). Taking the two drugs introduced by Philagrios, wild onion and vetch flour, the physician combines them through a process with syrup in order to form the pastille. The remainder of the drugs are identical to his predecessor, with a total of ten ingredients in his recipe. The fifth physician, Pythagoras, re-examined earlier recipes, reverting back to Andromachus the Elder and making adjustments to his theriac. As such, his version only includes five simple drugs: myrrh, bitterwort, laurel berries, long birthwort, and honey.[30]

[29] The manuscript is currently in a private collection in Europe. For details on this manuscript, see Kerner, PhD diss., 65–120.

[30] Kerner, PhD diss., 78.

1.4.4 Diagram 4: Recipe of Marinos

The sixth physician, Marinos, builds on Proklos' recipe by including the compound drug, *iqrāṣ al-asqīl*, in addition to eighteen simple drugs (fig. 1.17; Appendix, pages 9, 10, 11). As the first layer of this quadratic diagram, the *iqrāṣ al-asqīl* occupies the center, taking the form of a circle towards which the many component parts converge. Four drugs are enclosed in the four corners of the figure: birthwort, hyacinth, lavender, and myrrh. The scribe has rectified the placement of the drugs within the enclosure when compared to diagram 3; the red script in all four corners oriented towards the central circle in the current diagram. The second layer uses four identical phrases "*hadhān yanfa'ān* (the benefits of these two)" in a similar orientation to the script in the vertices, extending from the edge of the vertex into the central medallion. Like in the previous diagrams, the remainder of the sentence is inscribed in red cursive ink directly beneath. The third layer, constituting the outer border, features fourteen simple drugs: bdellium, horehound, long pepper, saffron, dittany of Crete, laurel berries, citronnella, crepe ginger, cinnamon, Chinese cinnamon, white pepper, black pepper, bitterwort, and wild rue. The caption preceding the figure describes the number of drugs in this composition as seventeen, a likely scribal error (see Appendix, page 10). Kerner's analyses of variant readings of this treatise also affirm the eighteen simple drugs comprised in this recipe.[31]

The inner square consists of additional layers of small-scale cursive script (style 1) in two colours: red and black. As the fourth layer, the red cursive script is employed for six phrases. While stylistically the six phrases are inscribed identically, conforming to a geometric aesthetic, the content is rather incongruous. The scribe presents the benefits

[31] Kerner, PhD diss., 80.

for a combination of four (vertical x2, vertical-right), three (horizontal x2), and two (vertical-left) drugs. The fifth layer is composed using five phrases in black script. These phrases are distributed and evenly spaced within the central square. Earlier diagrams use minuscule script to present complete sentences; in this case, each phrase is composed as two individual units, accentuated by gold rosettes at either end of each phrase. The first part of the phrase is inscribed on the right side of the square, with the subsequent phrase on the left using the diagram's center as a point of reflection. The five phrases are incongruous in content, indicating the curative properties of two (upper and lower-most) and three (center three) drug combinations.

While the content of the diagram is inconsistent at places, the scribe is able to find stability through his focus on the design elements. The quadratic figure is perfectly balanced and proportioned, using the central axes to illustrate horizontal and vertical symmetry. The distribution of phrases as two separate elements in layer five is likely to maintain the symmetrical quality of the image, which appears to be a prominent feature in all of the diagrams. It may be worth questioning the functional value of the cursive small-scale script, considering that not only is it challenging to read the script, but also challenging to decipher the combination of drugs that the script is referring to. The verbal inconsistency of the line segments extending from the edge of the squares into the center can be explained by the fact that the horizontal border encloses three drugs in comparison to four along the vertical edge, and as such the content will alter. For instance, the red script running vertically down into the central medallion reads: "these four are useful for the tearing of joints" likely in reference to the three drugs along the upper border in combination with the central pastille. By contrast, the phrase ninety degrees to its right

reads: “these three are beneficial for the bite of a rabid dog,” pointing to at least four drugs that are placed along the outer border. A more consistent content/design would have indicated the benefits of the five drugs—as it stands, the design challenges the reader to decipher the two drugs referred to by the scribe. The prevalent question is whether the addition of individual benefits was in keeping with the medical tradition seen in the delineation of works on simple drugs by Ibn Butlan and Ibn Baklarish (discussed in Chapter 2). Did, for example, the work increase in value, or was it viewed as more “authentic” and credible if it was more comprehensive in nature? On the other hand, does the inclusion of the cursive script add aesthetic value to the image and its function? Does this visual augmentation, and the organization of “busyness” contribute to the efficacy of the image? Does it also, in turn, reinforce the scribe’s scientific knowledge on pharmacopeia? Such questions shed light on the role that writing and scientific knowledge would have played in the medieval popular culture and imagination. These ideas will be examined in later chapters, but it is important to keep in mind the effect that the scribe’s aesthetic choices—especially as they challenge verbal readings—have on its viewers.

1.4.5 Diagram 5: Recipe of *iqrāṣ al-adhar kharūn* (hedychroum pastilles)

As the recipes for the theriac developed and matured over the years, they also became more comprehensive. Magnus of Emessa, having examined and tested Marinos’ recipe and his pastille, found a much more potent *iqrāṣ*. The *iqrāṣ al-adhar kharūn*, named after the city where the physician discovered the composition, became a central feature of all later theriac recipes (for the anecdote related to this discovery, see Appendix, page 11). In

the Paris manuscript, it is the only pastille to which the scribe has devoted an entire visual composition (fig. 1.18 a, b, c). A full page of the treatise illustrates this diagram, together with the caption referring to the image as a "composition (*tā'līf*)".

The diagram exhibits considerable differences in both design and content from the previous examples; a cursory glance reveals a major shift in relationships between the outer edges and the central medallion. The figure is composed of a central medallion enclosed within a series of nested squares. Starting from the outside in, the first layer is a wide outer border that is profusely decorated with vine scrolls and foliage. Devoid of any script, the four corners are bursting with a four-pointed motif, while the remainder encloses blue angular script (style 3) along the outer perimeter. The text within this border presents an ordinal chronology: the top degree (*al-martaba al-'uliya*); the middle degree (*al-martaba al-wusṭa*); the third degree (*al-martaba al-thālitha*); and the fourth degree (*al-martaba al-rābi'a*).[32] Rather than following a circular pattern, the chronology wavers from the top, with the middle represented on the right, the third on the left, and ending with the bottom (for comparisons with coins from this period, see Chapter 5).

The second layer is composed in a quadratic fashion, nested within the first, and emulating the contours of the preceding shape. The layer encloses twenty drugs in independent cells (see fig. 1.18c). All of the cells, apart from the lower border are in the angular script (style 2); the placement of eleven drugs in the lower border warranting a more compressed script. The third layer, an inset of the second, employs four phrases in black angular script (style 2) placed perpendicular to each other, to form a square. Each of the four phrases correspond to the drugs on its outer border, illustrating the proportion

[32] In later Persian annotations, the word *al-martaba* is incorrectly transcribed as *al-qarīna*

of the drug to be used in the mixture. As this layer of proportion is in direct conversation with the previous border of drugs, one may be able to follow the logic of why the scribe chose to distribute the drugs unevenly across the border. The fourth and final layer is a circular enclosure, denoted by a series of three concentric circles that provide instructions on combining the ingredients together. Inscribed in cursive red and black ink, the script emulates the two circles, with the inner circle completely decorated in what appears to be a four-pointed motif.

The set of three concentric squares framing three concentric circles presents a visual articulation of a recipe, complete with ingredients, proportions, and mixing instructions. As the reader proceeds from the outer border to the inner figures, a logical sequence is explicated by the scribe. The use of a relatively conspicuous circle at the center visually illustrates the mixing together of the various component parts. In comparison with the previous diagrams, which primarily highlight the drugs and the relationship between the drugs and the central binder, honey, in this figure the scribe provides a complete recipe. Conceived as a deliberate departure from the conventional square of opposition, seen in the preceding compositions (see Chapter 2 for squares of opposition) the scribe is visually signaling this figure as diverging from the others based on its content. This difference is also highlighted in the caption that mentions the word *tā'līf* (composition) as opposed to previous descriptors that were labelled as *al-adawiyya al-murakabba* (compound drugs). No longer is this a variation of the square of opposition —it lacks the four corner elements and the diagonal/oppositional relationships. Instead, what we see here is a set of data that has a direct bearing on the information that frames

it. The use of the nesting feature works well to serve this: each successive internal figure builds on the preceding one.

In this diagram, the visual emphasis shifts from that of drugs to that of their relative degrees/stages, as the latter is now seen on the outermost border inscribed in a larger, more prominent, manner. Given that there is consistency of content across the four borders, there is also visual symmetry and balance. Even in the second layer where the drugs are disproportionately allocated, the scribe has maintained symmetry at least in the vertical representation of the drugs. The top horizontal frame presents a chevron pattern, seen also in diagram 4 and medicinal works such the *Taqwīm al-siḥḥa* —abandoning a symmetrical representation in this row (see also Chapter 2). The use of the chevron pattern across manuscripts in this period highlights this visual device as an important feature in the aesthetic toolbox. It is challenging to decode whether the use of chevron pattern versus a symmetrical alignment in this top row was predicated by a functional decision, but it is worth noting the different aesthetic techniques incorporated by the scribe. A simpler explanation might be the scribe's desire to exhibit a variety of aesthetic practices.

1.4.6 Diagram 6: Recipe of Magnus

Having developed the *iqrāṣ al-adhar kharūn*, Magnus employs this pastille as part of his theriac recipe (for recipe instructions, see Appendix, page 21). The entitled "compound medicine (*adawiyya al-murakab*)"[33] comprises of thirty-eight simple drugs and two pastilles. A full-page composition includes a caption and the quadratic diagram to

[33] The word *adawiyya* is incorrectly spelled in the manuscript.

illustrate this recipe (fig. 1.19). Following the visual model of the previous geometric depictions, the first layer conforms to a quadrilateral image with four vertices; however, they now carry a total of six drugs. The central medallion denotes the word *iqrāṣ* inscribed twice, alluding to a sort of rotational symmetry. In order to achieve this, the letter *rā* has been used only once and serves as the axis of rotation. The scribe has also included a filler motif (U-shaped) on the horizontal inscription to further accentuate a reflective symmetry. This dual use of the word *iqrāṣ* fulfills a functional role as well, denoting the presence of both the pastilles: *iqrāṣ al-adhar kharūn* and *iqrāṣ al-asqīl*. The names of the pastilles are inscribed in minuscule red cursive script inside the circle. The second layer is the diagonal line segments extending from the vertex into the central medallion. In the third layer, the ingredients are distributed along the outer border in individual cells, closely following the model from diagram 4.

The next four layers (layers 4, 5, 6, 7) exhibit a significant departure from the previous models; the scribe adds two layers of nested squares that are followed by vertical and diagonal line segments. In layer four, the internal square in angular red (style 2) is composed using four line segments. Some observations can be made here: first, this layer was inscribed after the diagonal blue segments (layer 2), most evident from the composition of the upper horizontal phrase that makes adjustments to accommodate the blue diagonal at the beginning of the phrase. This results in a concession for the last word, where the final two letters are executed on a vertical plane. The phrase reads: "*hadhān yaṣlihān* (good for) *fasād* (increase) *mizāj al-yabūsa* (the temperament of drying)," relating to humoral medicine.[34] The second observation for this layer relates to

[34] See chapter 6 for the theriac's relationship to Galenic medicine.

the inscription of the bottom horizontal line segment. Depicting this text in an upright manner, the scribe defies prior arrangements of this design where the script was inverted (such as in diagram 5, layer 3). The fifth layer (nested square in black angular script) follows its predecessor, conforming to a square figure, with extended edges. Both layer four and five are consistent in content, presenting the beneficial uses of two drugs—although references to the two drugs are unclear.

The sixth layer is comprised of two vertical lines that flank the central medallion, extending from the upper frame of layer five to the lower frame of layer four. Both these lines illustrate the beneficial qualities of four drugs. This layer is peculiar in that it is positioned between a layer and a half, and the vertical segments depicted in this manner have not been illustrated in any of the prior figures. The former is likely due to the design challenge imposed on the scribe, resulting from the positioning of the inner nested square (layer 5) being out of proportion with respect to the central medallion. As such, there is an asymmetrical arrangement of the horizontal bands in the layer, constricting the space between the upper bands of layer 4/5 and inflating space between the lower bands. It is possible that the scribe manipulated the diagram by adding layer six in an attempt to distract attention away from the open, gaping space. Such manipulations highlight the experimental quality of the diagrams and the scribe's willingness to accommodate and adjust as needed. The final layer (layer 7) uses cursive script that emanates from the vertical segments of layer four and diagonally extends into the central medallion, narrating the benefits of three drugs each.

Through the layering of information in this way, the scribe has combined the diagrammatic style of the square of opposition as well as the nested square technique.

The visual complexity in this combination of techniques likely relates to the amplification of the number of required component parts in the recipe. Additionally, the inclusion of the nested square composition in concert with the square of opposition suggests a visual convergence of the *iqrāṣ* (seen in the form of nested squares) with the theriac recipes previously discussed in this treatise (seen in the form of squares of opposition).

1.4.7 Diagram 8: Recipe of Andromachus the Younger

Appearing after the first circular composition, this quadrilateral diagram is the second of the three diagrams illustrating the famed theriac recipe of Andromachus (fig. 1.20). Incorporating a series of six nested squares, the diagram is composed using two pages facing one another in a technique known as "lateral expansion."[35] This device seemed to have gained currency in medieval Arab book illustrations from the Jazira, witnessed in manuscripts such as *Kitāb al-Bayṭara* (Topkapı Sarayı MS Ahmet III 215) and the Paris *Maqāmāt* (BnF arabe 5847).[36] Considering that the *Kitāb al-diryāq* manuscript is the earliest extant illustrated treatise, this diagram is likely one of the first times that this technique was exploited. The two-page diagram can be divided into three outer squares and three inner squares; the latter devoid of negative space and distinguished by the extensive background ornamentation and script. Consistent with prior arrangements, the first layer features a total of sixty-eight drugs in individual cells between squares two and three (see annotated diagram marking the six squares, fig. 1.20). As seen with the other theriac recipes presented in the quadratic form, the four corner vertices are (somewhat)

[35] David James, "Space-Forms in the Work of the Baghdād 'Maqāmāt' Illustrators, 1225-58," *Bulletin of the School of Oriental and African Studies*, University of London 37, no. 2 (1974): 307.

[36] James, "Space-Forms," 309.

distinguished by inscribing them in black ink. Here, they enclose the pastilles: viper flesh (*iqrāṣ al-afā'ī*), scilla (*iqrāṣ al-asqīl*), and hedychroum (*iqrāṣ al-adhar kharūn*, x2). Unlike the other diagrams seen thus far, the vertices are not visually demarcated from adjoining cells; both script and the background are identical in all of the cells in the vertical borders. The horizontal layer comprises of eighteen cells in each of the upper and lower registers that use cursive script and a chevron pattern to inscribe the remainder of the drugs, the scribe alternating red and black ink after every two drugs.

In the second layer, four diagonal script segments extend from the each of the vertices into the region of the inner squares. Using the word *hādhān*, each of the pastilles is connected to the central set of squares. Since the central set of squares is not a drug, it is challenging to decipher which two drugs are under discussion. One possibility is that the blue angular in square four mentions the presence of *iqrāṣ al-afā'ī* (viper flesh pastilles), perhaps identifying the benefits of the combination of two pastilles. The third layer, situated between squares three and four, delineates the usefulness of each of the simple drug identified in the first layer. The script, alternating between red and black throughout the encircling layer, is directed from the adjoining drug into the central layers. The fourth layer is placed at the outer edge of the entire quadratic diagram, in the form of a series of repetitive words that encircle square two. The word *hadhihi* serves as both a decorative device—forming a geometric layer—as well as a functional tool—grouping a set of drugs. Through this technique, the scribe is not restricted either to the number of combinations in total or the number of drugs in each combination. However, it is unlikely that the order of the drugs is arbitrary; rather the placement and sequencing of the individual drugs is as much dependent on the relationships between the adjoining drugs,

as it is to the theriac recipe as a whole. The meticulous attention to detail suggests careful planning on the part of the scribe. In the fifth layer, the scribe has exploited another technique to further illustrate combinations that were unable to be contained in the previous layers. In the lowest part of the diagram, across the two pages, an angular script reads: "*hadhihi al-arba' tanfa'*", which likely refers to the four drugs that the scribe has marked using a semicircle on the right folio. Four additional drugs are indicated on the left folio; however, their combined benefits have been noted separately, distributed within the two semicircles that they identify. Considering that the angular script extends towards both folios, it is equally plausible that the scribe might be referring to the four groups of drugs, rather than the four individual drugs. In a similar manner, the uppermost edge identifies the benefits of two drugs (myrrh and cinnamon) that are indicated through the semicircle motif.

Squares four, five, and six, are visually articulated as the central feature of the diagram, denoted through copious ornamentation (undulating scrolls and foliage), use of gold, and heavily stylized script (translated in Appendix, pages 66 and 67). The sixth layer wraps around square five, closely emulating the geometric shape. Inscribed in blue ink, the bounds of each word are horizontally extended to serve as a framing device. As the quadratic frame itself is divided into two folios, the scribe has made internal adjustments that seek to present a unified segment. The seventh layer follows suit by inscribing in red script. Visually, the red script is bolder than its blue counterpart, and acts as a formidable frame encompassing its successive layer, with horizontal and vertical extensions reaching to its edges; its content, however, seems superfluous, with repeated words not germane to the overall illustration. The use of the word *tā'līf*

(combination/composition), repeated twice, provides a sort of label for the diagram. As the eighth and final layer, five lines of densely executed cursive script are packed into the innermost component of the figure. From a distance, the compact script is camouflaged amidst the dense ornamentation in the preceding layers, and it only upon closer examination can one decipher the presence of script. In this layer, the scribe explicates the rationale behind the working of the theriac; that is, that each of the drugs is individually beneficial, but the combinations of drugs in this manner leads to a greater force (*quwwa*), namely *mīzāj*, efficient in healing the body (for a comparison with the workings of the magic square, see Chapter 3).

1.5 Circular Diagrams

The manuscript has two circular diagrams, both of which are located towards the end of the treatise. Presented as full-page compositions, both diagrams illustrate the theriac recipe of Andromachus the Younger and Galen, deemed as the most comprehensive and virtuous. Essentially, the two diagrams are representing similar information as that presented in the quadratic diagrams, namely the component drugs together with their individual and combined medicinal uses. Yet, the scribe chose to present these diagrams by employing a circular figure and identifying them as *shakl*, visually distinguishing the final perfected theriac from the other recipes in the manuscript (for the circle as a symbol of perfection, see Chapter 4). Both circular compositions are framed by a quadrilateral enclosure.

1.5.1 Diagram 7: Recipe of Andromachus the Younger

This circular diagram is composed of seven concentric circles that enclose and are framed by a combination of angular and cursive script (fig. 1.21; for a complete translation of the diagram, see Appendix, page 65). The first layer uses the technique of radial lines between circles two and four (see annotated diagram, fig. 1.21) to feature the seventy drugs and their individual benefits. Distributed amid two concentric circles, the script is directed towards the inner circles, visually converging into the center (style 1). While pleasing to the eye, the interchange of red and black ink is also functionally valuable, dividing the text into smaller units and making it easier to find and locate the text.[37] Apart from the compression of the script to accommodate the spate of ingredients for this recipe, the script is rendered legibly and fully vocalized with orthographic marks. Inscribed closer to the outer edge of the diagram, the second layer rests between circles one and two, encircling the spokes identified earlier. Within this space, the scribe indicates the beneficial qualities of nine groupings of drugs. In order to do so, the word *hadhihi* has been stylized (style 2) using an elongated or compressed ligature as needed to form a cluster of drugs. The benefits are then inscribed in small cursive script (style 1) directly beneath. While the function of the ligature might be to group the component drugs, the elongation of the ligature also conforms to the arc of the preceding figure, conflating the boundary between script and geometry. The red and black interchange in this case is presented not only though the rendition of each successive stylized word, but

[37] Such interchange of colors also appears in Christian manuscripts on herbals (blue and red in this case), such as the copy at the British Library, Egerton 747 dated to c. 1300. There is limited scholarship on color and its meanings in the medieval Islamic world. For color theory more generally, see Eric Kirchner, "Color Theory and Color Order in Medieval Islam: A Review," *Color Research and Application* 40, no. 1 (2015): 5–16. For colors in mystical practice, see Eyad Abuali, "Words Clothed in Light: Dhikr (Recollection), Colour and Synaesthesia in Early Kubrawi Sufism," *Iran: Journal of the British Institute of Persian Studies* 58, no. 2 (2020): 279–92.

also between the stylized script and its cursive counterpart. The script in this layer moves in a clockwise direction and is inscribed facing the outer circle. While the illustration of the combined drugs in this manner provides a relatively easy identification of the drugs being referenced, there are several occasions where the referenced components are challenging to isolate (see Appendix, page 65).

Proceeding closer to the center of the figure, four concentric layers of text alternate between cursive black and angular red, forming the third layer. The outermost of these encloses script iterating textual material from the quadrilateral enclosure (Appendix, page 65). The entire set of seven concentric circles is framed by black angular script emulating the outermost circumference, denoting the fourth layer. The script is separated into upper and lower registers, reading: "auspicious beginning (*maymūn al-ibtadā'*)" and "blessed ending (*mubārak al-intahā'*)" respectively. As parts of the circle's circumference are contiguous to the quadratic enclosure, the encircling script is suited to feature as two separate texts. A visual symmetry between the two phrases is achieved through stylized script, accentuating geometric extensions and decorative interlacing, while downplaying the individual letters.

The circular composition encompassing the entire page is enclosed within a quadratic figure; the final, fifth layer. Paired with black angular script (style 2) in four different planar orientations, the emulating rectangle-shaped script pattern also serves as a caption in this case:

> the total of dry drugs (*al-adawiyya al-yābūsa*) in this composition/diagram (*shakl*) is seventy drugs. And these seventy drugs and three pastilles (*iqrāṣ*) are combined with Andromachus' – may God have mercy on him – electuary of the theriac (*ma'jūn al-diryāq*), known as al-faruq (*al-fāriq*). And it is of utmost wonder (*ghāyat al-'ajāb*) and splendor (*al-jawda*)[38]

[38] Translated by author.

The scribe has titled the diagram as *shakl*—unlike other diagrammatic iterations in the treatise, this is the first time that we see the word *shakl* incorporated into the description of the figure. Other times it has been described as *adawiyya al-murakabba* in the theriac recipes of the physicians, or *tā'alīf* as with the presentation of the pastille. The use of a quadrilateral frame as the final enclosure for this diagram urges one to question whether there was an inherent role played by this geometric form, considering that it was a significant feature of all prior compositions in the treatise (for an extended discussion of this shape, see Chapters 2 and 3). In terms of the aesthetic component, the quadratic definition of script is inscribed upon a background of fine-scrollwork and foliage decoration, providing an ornate quality to the image while emphasizing the prominence of the text. The visual balance of the script is maintained throughout the line segments by manipulating the script and adding filler motifs, particularly witnessed at the end of each line segment. There appears to be considerable planning involved as the final line segment of the figure and the words placed towards the end of the caption are evenly spaced and are not compressed in the slightest. Examining the content of this decorative scriptural arrangement provides some interesting observations. Firstly, the content is not germane to the diagram; rather it serves more as a caption without providing additional information integral to the recipe. In fact, the verbal content iterated in the quadratic arrangement is also part of the inner component of the circular figure, thus rendering the content redundant. Secondly, the inscription bestows Allah's blessings on Andromachus, the Greek physician of antiquity. In this way, it seeks to Islamicize the Greek physician, which is reinforced by the portraits presented towards the beginning of the manuscript, a

recurrent theme in manuscript paintings of this period.[39] Thirdly, and most importantly, is the description of this composition as one of utmost wonder (*ghāya al-ʻajāb)* and splendor or perfection (*al-jawda*). Combining this with words such as *mubārak* and *maymūn* that frame the circular figure suggests that there is more to the diagram than merely the presentation of a theriac recipe (for more on "wonder" and a discussion of this image, see Chapter 6).

1.5.2 Diagram 9: Theriac Recipe of Andromachus the Younger and Galen

Similar to the previous diagram in both design and content, diagram nine visually illustrates the theriac recipe of Andromachus/Galen as a circular composition encompassed within a quadrilateral figure (fig. 1.22). In this diagram, there are eight concentric circles (see annotated diagram, fig. 1.22), within which the scribe presents a combination of angular and cursive script. The first layer is the incorporation of the drugs into the figure (style 1); using the technique of radial line or spokes between circles two and three, the scribe highlights sixty-nine drugs in a similar manner as its predecessor. The second layer of script (style 2) wraps around the outer circumference of circle four, adding in the binder "honey" (*al-ʻasl*). The ligature between the last two letters is expanded to encompass the drugs within the fourth circle, all of which constitute the formulation of the *iqrāṣ al-adhar kharūn*. This third layer of twenty drugs (style 2) can also be seen in diagram five (recipe of the *iqrāṣ*). Unlike the other diagrams (both circular and quadratic) that merely label the presence of the *iqrāṣ*, this diagram has expanded and

[39] Acclimating Greek physicians within the Islamic world is a common trope in medieval Arab paintings. Examples of Greek physicians in Islamic garb include paintings in Al-Mubashshir's *Mukhtār al-ḥikam wa maḥasin al-kalim* (Istanbul TKS, Ahmet III, 3206) and Dioscorides' *De Materia Medica* (Harvard Art Museums 1960.193).

has sought to present the individual components of the pastille, highlighting its significance. Nested between circles four and five, the layer is subdivided in the manner of spokes; however, the script in this case is inscribed diagonally, forming a chevron pattern. In this way, the circular layer seeks to operate independently as a subset, rather than relate to adjoining layers or converge into the center, as seen with the previous recipe.

The fourth layer is composed of script incorporated in the four innermost circles. Circles six and seven use angular black and red script respectively (style 2), to mimic the outer circumference. In this manner, a total of four additional drugs are presented: semola bread, viper flesh, scilla onion, and black vetch flour. Within circle seven, repetitive series of the phrase: "and then mix," presents itself in the form of radial lines, alternating between red and black ink. Inscribed in a freehand cursive script with each successive repetition partially overlaying the previous, the use of script in this fashion appears to resemble ornamental decoration from a distance.

The two outermost tiers of encircling script constitute the fifth layer. Wrapping circle two in red script is a single phrase: "its composition (*tartabhu*) is made up in accordance (*yajrī*) with this model (*mithāl*)."[40] Around the first circle, wrapping of two sets of phrases offering an "auspicious" beginning and ending, identical to the preceding diagram, is repeated. Finally, as the sixth layer, a quadrilateral enclosure completes the diagram. The black angular script around this border is identical in design to its counterpart in the previous diagram, with a slight variation in content. Serving as a caption or title to the figure, the rectangular frame reads:

[40] Translation taken from Micheau, "The Medicinal Value," 61.

> the dry drugs in this composition/diagram (*shakl*) and in the pastilles are sixty-six. And this theriac is attributed (*mansūb*) to the physician/sage (*al-ḥakīm*), guardian of souls (*amīn al-arwāḥ*) Andromachus, to whom may God, praise be to God, extend his forgiveness and mercy[41]

Particularly intriguing in this caption is the use of the phrase "*amīn al- arwāḥ*" to describe the role of Andromachus. In addition to Islamicizing the Greek physician, as noted in the previous diagram, Andromachus's elevated status also deems him equivalent to a revered personality in the medieval milieu. He is respected and valued not only for his contributions in the world of scientific advancement, but his knowledge of science appears to be invariably connected to the knowledge of the supernatural, and thus he is equally well-positioned as a guardian of souls (see Chapter 6 for more on *amīn al- arwāḥ*, saints and *rūḥāniyāt*). In this figure, the scribe has referred to the diagram as *shakl* in the quadratic inscription, and *mithāl* in the encircling ones. Visually, this diagram appears bolder than its preceding counterpart, as it primarily features names of the drugs, obviating individual and combined benefits.

Conclusion

The title of the *Kitāb al-diryāq* informs us of the manuscript's affiliation (direct or indirect) with the Late Antique schools of Alexandria and as part of the *jawāmiʿ* or summary traditions, popular for works on medicine. The *Kitāb al-diryāq* stands apart from other scientific and religious manuscripts for its opulence—in size, figural illustrations, calligraphy, and illumination. The manuscript is also replete with

[41] Translation adapted from Micheau, "The Medicinal Value," 61.

diagrammatic compositions that visualize the theriac recipes, each image meticulously crafted using a combination of geometric shape and script.

The diagrams can be divided into tabular representations, quadratic compositions, and circular arrangements. Tables are employed in the manuscript to present new information rather than explanatory materials. Devoid of titles, the tables can be seen as an extension of prose text, oscillating between text and image. Quadratic images comprise most of the diagrams in the manuscript. The square or rectangular form visualizes the theriac recipes of the nine physicians as well as one of the pastilles (*iqrāṣ al-adhar kharūn*). As the treatise explicates the development of the theriac by each successive physician, the quadratic images accompanying the physician's theriac recipe visually articulate this development. Each successive quadratic diagram is visually richer and more detailed, drawing from the square of opposition image prevalent in scientific manuscripts of the period. The scribe's manipulation of script on the other hand—variety of script styles, planar variations, ornamental additions—are reminiscent of the Qur'an manuscripts of the so-called New Style. This combination allows the scribe to visualize conceptual relationships between the different component parts of the theriac recipe. Two full-page circular diagrams mark the final, perfected recipe of Andromachus the Younger and Galen. The visual recipes are framed by quadrilateral inscriptions that serve as an element of prayer and protection for the esteemed theriac—verbally and visually. The circular diagrams employ additional phrases—*shakl*, *'ajāb*, *maymūn*, *mubārak*—that suggest that the images may be operating in a realm not confined to the natural world.

This chapter has focused on the visual tools and aesthetic choices of the scribe, in particular the script styles and sizes, visual balance and symmetry, planar orientations,

ornamental additions, and repetition of words. The detailed descriptions of the diagrammatic representations in the *Kitāb al-diryāq* lead to some overall remarks. First, the aesthetic choices employed by the scribe contribute to a larger visual goal: the construction and amplification of geometric shapes or patterns. The set of visual devices, particularly the script, is relegated to the service of the shape. The script is employed in conjunction with or independent of geometric lines and curves, with its ligatures compressed and elongated, repeated, ornamented, or oriented multidirectionally to augment the geometric shape. The aesthetic manipulation of script in this manner has severely compromised the legibility of the words. The pages invite a *viewing* of the text rather than a *reading* of the text. Secondly, the deployment of visual tools to create diagrammatic compositions has enabled the scribe to either construct or make apparent the relationships between the various entities. The conceptual medicinal formula, the theriac, is provided with a visual form that not only illustrates its different component parts, but also visualizes the inner workings of the compound medicine. In this way, the diagrammatic image becomes part of the scribe's "extended mind" or a "mental representation" (see Theoretical Framework).[42] The "extended mind" is equally applicable to the viewer, where the diagrammatic image enables imaginative thinking about the workings and effects of the theriac. The detailed descriptions of the diagrams highlight that the scribe has employed a certain "logic"[43]: for instance, the earlier

[42] Andy Clark and David Chalmers, "The Extended Mind," *Analysis* 58 (1998): 10–23; Kamini Vellodi, "Diagram: Deleuze's augmentation of a topical notion," *Word and Image* 34, no. 4 (2018): 299–301.

[43] See the summary of Peirce's "The Icon, Index, and Symbol," by Fernando de Toro, "The Icon, The Index and the Symbol According to Peirce," in *Theatre Semiotics* (Toronto: University of Toronto Press, 1995), 73–76.

quadratic images (the theriacs without the pastille) are imagined as a square of opposition; the *iqrāṣ* (pastille) is represented as a set of nested squares; and the last two quadratic compositions (the theriac with the pastilles) are constructed as an amalgamation of the square of composition and the nested square form, to illustrate the theriac and the components of the pastille. Such diagrammatic formations suggest that the relationships between the component parts of the theriac is integral to their visual form. The variations in the placement of the drugs from one diagram to the next further corroborate this significance of relations (see for instance the drug placement in diagrams 1 and 2). While the opulence of the diagram takes centre stage, the calligraphic compositions are equally, if not more importantly, cognitive devices. They are building and creating relationships, even if to the modern viewer, the relationships do not appear to have a practical application. *What do these relationships represent or signify?* That is, if one takes representation to be the purpose of the images. The diagrams are also "working images"[44] (see theoretical framework). They are performative in the sense that are enforce an embodied response from the viewer. By visually orienting script in many directions, the diagrams are reorienting the eye and the mind of the viewer, even extending to the hands and the body of the viewer (if one is to physically move themselves or the book). This combination of cognitive and embodied engagement generated by the spatial relations in the diagrams promotes non-linear thinking and associations, leading to the production of new knowledge and the creation of meanings.[45] *What kinds of knowledge and meanings are being generated by the diagrammatic images?* To answer these two questions, the

[44] For diagrams as "working objects" see John Bender and Michael Marrinan, *The Culture of Diagram* (Stanford: Stanford University Press, 2020), 33.

[45] See Theoretical Framework (Introduction) for a discussion on this topic.

next four chapters will examine the different materials and genres in which geometric script patterns occur, the relationship of script patterns with their users and beholders, and the role of geometrical shapes as embodiments of knowledge.

Chapter 2 Ordering the World: Diagrams in Scientific Manuscripts

Diagrammatic structures, as seen in the pages of the *Kitāb al-diryāq*, were a common form of dividing, classifying, and organizing information in Late Antiquity and the medieval period. This chapter will focus on Arabic manuscripts from the eleventh to the thirteenth centuries to illustrate the prevalence of geometric configurations, examining treatises where the shapes appear most frequently: health, medicine, astronomy, and geography. The discussion will also probe into possible meanings generated by the manipulation of space and text on the manuscript page. Diagrams, more generally, are not only conduits of knowledge; rather their visual shaping of information also has the potential to generate new forms of knowledge and shape viewer perceptions and worldviews.[1] This chapter demonstrates the semantic value of lines and shapes in Arabic manuscripts, illustrating their cultural meanings and associations. The discussions establish that the diagrammatic structures were integral to the ways in which knowledge was conceived, interpreted, and presented to the readers. The chapter takes a typological approach to the study of diagrammatic structures, mirroring the visual forms seen in the previous chapter. As such, only diagrams relevant to the geometric forms of the *Kitāb al-diryāq* are examined in detail: tabular structures; quadratic compositions; and circular arrangements.

[1] Johanna Drucker, "Diagrammatic Writing," *New Formations* (2013): 90. For a detailed analysis on the semantic role of diagrams, see the theoretical framework in the Introduction.

2.1 Tabular Representations

Tabular forms of presenting information were a popular visual strategy in medieval Islamic manuscripts, especially related to health and medicine. The straight lines placed in parallel, perpendicular, and intersecting trajectories generate a series of cells in which text is inscribed. These are known as synoptic tables: they present collated and summarized information. Scholars have traced the practice of synoptic tables to the Graeco-Arabic translation movement of the Abbasid period in the ninth century, or even earlier to the Late Antique schools of Alexandria.[2] One reason for the popularity of tables is the flexibility of its form: the geometric lines of the tables are amenable to account for the range of text lengths, categories, and relationships. Synoptic tables in extant manuscripts may take up a full page, a double-page, or even structure the entire manuscript in the form of one large table; at other times they fill only a fraction of a page. As the examples below will illustrate, tables exhibit a range of formats, in terms of number of columns and rows, or their dimensions.

One of the most copied treatises with tabular representations is the *Kitāb Taqwīm al-ṣiḥḥa* (*Book of the Almanac of Health*) by Ibn Butlan (d. 1066), a Christian physician serving at the court of Baghdad. The treatise employs a series of forty tables to explicate the properties and usefulness of 280 plants, animals, and other elements. The primary

[2] For tables as didactic devices in Late Antique Alexandria see Peter Pormann, "Medical Education in Late Antiquity from Alexandria to Montpellier," in *Hippocrates and Medical Education*, ed. Manfred Horstmanshoff (Leiden: Brill, 2010), 419–41. Tabular representations, however, are only extant in Arabic texts circulating since the translation movement of the eighth and ninth centuries, see Emilie Savage-Smith, "Galen's Lost Opthalmology and the Summaria Alexandrinorum," *Bulletin of the Institute of Classical Studies* 45, no. S77 (2002): 121–38. For an overview of the Graeco-Arabic translation movement see Dimitri Gutas, *Greek Thought, Arabic Culture: The Graeco-Arabic Translation Movement in Baghdad and Early Abbasid Society* (London: Routledge, 1998).

concern of the author is the health and hygiene of the human body.[3] Several known copies of the manuscript delineate this tabular format of arrangement, where a header runs across the page, with columns that describe the humoral quality of the drug (that is, whether it is hot, cold, dry, or wet), the degree of intensity, optimal form of use, ill-effects, pharmacological benefits, its dangers, and antidotes for protection. Moving down the page are rows of different curative drugs and their descriptions relating to the header.[4] Ibn Butlan's entire treatise is structured in this tabulated and concise form, without any superfluous discussions or arguments. By employing a tabular methodology, the author is dividing and classifying information, and creating relations between disparate entities. Arranging the text in this manner is pragmatic: the information is faster and easier to consume. Moreover, the curative elements are all subject to the same set of rules; that is, each drug is articulated by the same set of categories and presented in the same fashion. In this way, the tables provide a sense of order within the manuscript.

In addition to this geometric structure, extant copies of the treatise augment the visual effects by rendering the text in a variety of different planes: horizontal, vertical, and diagonal (see fig. 2.1). The most palpable effect is produced by the text copied in diagonal planes within the cells of the table. The visual effect of this arrangement is rather striking where alternating chevron patterns on each row give rise to a geometric formation of squares on the entire page—a pattern equally developed in the *Kitāb al-*

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[3] For Ibn Butlan, see J. Schacht, "Ibn Buṭlān" in *Encyclopaedia of Islam,* Second Edition, accessed September 21, 2021, http://dx.doi.org/10.1163/1573-3912_islam_SIM_3120; and Manfred Ullmann, *Medizin im Islam* (Leiden: Brill, 1970), 157–8.

[4] For a detailed examination of the different categories and examples of entries, see Emilie Savage-Smith, "Ibn Baklarish in the Arabic Tradition of Synonymatic Texts and Tabular Presentations," in *Ibn Baklarish's Book of Simples: Medical Remedies between Three Faiths in Twelfth-Century Spain*, ed. Charles Burnett (London: Arcadian Library in association with Oxford University Press, 2008), 117–21.

diryāq. Even if the reader is unfamiliar with the tabular methodology, the geometric structure allows one to logically follow the contents of each row, moving from right to left.[5] The medieval extant copies of the Ibn Butlan treatise further the visual dimension through the addition of numerous features within the tabular structure. A manuscript (c. 11th C, auctioned at Christies in 2011), for example, has circles inscribed inside the tabular cells, and the diagonal text is placed within them.[6] The final effect on the page is a series of circles within the tabular format. If one tilts one's head slightly, a different set of patterns emerges whereby a tessellation of squares is produced. The BL manuscript (Or. 1347, dated 610 AH/1213 AD) is much more elaborate. The table retains the basic structure, including the diagonal writing planes; however, additional borders are added around the diagonal rendition of the script, providing an overall effect of intersecting octagons (fig. 2.1). The scribe has devoted much planning and organization to this manuscript of royal patronage, made for al-Malik al-Zahir (r. 1193–1216), the ruler of Aleppo. Two other copies of the manuscript from the fourteenth century present the information in less elaborate forms and use the diagonal layout of the text itself to engender the geometric forms.[7] The preservation of the tabular format and the diagonal orientation of text in all of the treatises suggests that the visual form was as important as

[5] Interestingly, the scribe of the *Kitāb al-diryāq* executes the contents of the table from left to right. See Appendix, page 13, 19.

[6] Christies, *Art and Textiles of the Islamic and Indian Worlds including Works from The Collection of the Late Simon Digby*, April 2011, Sale 5744, Lot 10.

[7] See MS Bodl Or. 266 (undated, thirteenth-fourteenth century); Aga Khan Museum 516 (dated 1344 AD). For a discussion of Ibn Butlan, tables, and their relationship to the *Kitāb al-diryāq* see also Meekyung MacMurdie, "Proven Recipes: Geometry and the Art of Arabic Medicine," in *The Diagram as Paradigm: Cross-Cultural Approaches*, ed. Jefferey Hamburger, David Roxburgh, and Linda Safran (Washington, DC: Dumbarton Oaks, 2022), 337–44.

the textual content. The name of the treatise—*taqwīm*—further signifies a concise and list-like arrangement of information.

Tables are also a prominent feature in the works of Ibn Jazla (d. 1100), another physician living in Baghdad. His treatise, *Taqwīm al-abdān fī tadbīr al-insān* (*Almanac for Bodily Parts for the Treatment of People*) discusses diseases and fevers of the body and its therapies. Ibn Jazla's extant copies, similar to that of Ibn Butlan, delineate the diseases into tabular forms, allowing for easy reference and consultation of material.[8] The treatise employs forty-four tables with twelve columns to describe 352 diseases and the dietary remedies for them.[9] The presentation of text in the table cells also adheres to a diagonal plane to create the dynamic effect of chevrons and rhombuses.[10] The use of the title *Taqwīm* and the tabular form appear to become synonymous as other twelfth-century treatises similarly incorporate synoptic tables: *Taqwīm al-'adawiya al-mufrada* (Almanac of Simple Drugs) composed by Ibn al-'Ala'i (fl. 12th century, Anatolia) explicates the properties and benefits of 550 drugs; the *Taqwīm al-'adawiya al-mufrada wa-l-aghdiya* (Almanac of Simple Drugs and Foodstuffs) by al-Tiflisi (fl. 12th century) covers over 1600 medicaments, drugs, and foodstuffs; [11] and the *Kitāb al Musta'īnī* (*Book of*

[8] Ibn Jazla might have been inspired by the *Taqwīm* of Ibn Butlan, using both the title and the tabular arrangement for his own treatise. See J. Vernet, "Ibn Djazla," in *Encyclopaedia of Islam,* Second Edition, accessed August 11, 2021, http://dx.doi.org/10.1163/1573-3912_islam_SIM_3142.

[9] Efraim Lev, "An Early Fragment of Ibn Jazlah's Tabulated Manual '*Taqwīm al-Abdān*' from the Cairo Genizah (T-S Ar.41.137)," *Journal of the Royal Asiatic Society of Great Britain & Ireland* 24, no. 2 (2014): 191.

[10] An early manuscript is housed at the National Library of Egypt (produced c. 1050–1100), https://www.wdl.org/en/item/3949/. Later manuscripts include a fifteenth-century copy in Karshuni (Arabic in Syriac characters), Special Collections, University of Glasgow, Sp Coll MS Hunter 40 (T.1.8); and a sixteenth-century copy at Yale University, Historical Medical Library: Cushing Arabic Ms. 11.

[11] It must be noted that the extant manuscripts of al-'Ala'i and al-Tiflisi date to the fifteenth century. Savage-Smith, "Ibn Baklarish," 122–6.

Musta'ini) by the Jewish physician, Ibn Baklarish (fl. 11th–12th century), located at the Arcadian Library in London that outlines simple drugs, its natures, and benefits for the human body.[12]

One of the most important series of manuscripts—for the purposes of the discussion in this chapter—that employ synoptic tables is that of the so-called *Jawāmi' Iskandriyya* (*The Alexandrian Summaries*). The treatises are described as summaries; rather they can be understood better as abridgements and commentaries of the books of the Greek physician, Galen.[13] They are thought to have been written in Late Antique Alexandria during the height of scholarship in medicine and are, therefore, labelled as such. Scholars have speculated on the Greek origin of the treatises, from which the Arabic versions derive.[14] The earliest extant manuscripts, however, only survive in Arabic and are dated between the twelfth and thirteenth centuries. The *Jawāmi' Iskandriyya* are especially pertinent to the discussion of the *Kitāb al-diryāq* for several reasons: i) they both incorporate the title of *jawāmi'* (see Chapter 1 for the title pages of the *Kitāb al-diryāq*); that is, they both draw from the tradition of creating summaries; ii) they affiliate themselves with Late Antique Alexandria, the *Jawāmi' Iskandriyya* in its title and the *Kitāb al-diryāq* with its Alexandrian commentator, Yahya al-Nahwi; iii) both treatises claim to be connected to the works of Galen specifically; iv) both profusely

[12] See Savage-Smith, "Ibn Baklarish," 113–32. See also Martin Levey, "The Pharmacological Table of ibn Biklārish," *Journal of the History of Medicine and Allied Sciences* 26 (1971): 413–21.

[13] For an overview of the summary tradition, see Peter E. Pormann, "The Alexandrian Summary (*Jawāmi'*) of Galen's on the Sects for Beginners: Commentary or Abridgement?," *Bulletin of the Institute of Classical Studies* 47 (2004): 11–33.

[14] Emilie Savage-Smith, "Galen's Lost Opthalmology and the Summaria Alexandrinorum," *Bulletin of the Institute of Classical Studies* 45, no. S77 (2002): 121–38.

incorporate a variety of geometric compositions in their folios.[15] An early rendition of this summary work is found in the Bodleian Library copy, MS Hunt. 600 (fols. 15a–35a), *Kitāb Jawāmi‘ iḥdā ‘ashrat maqāla min kitāb Jālīnūs fi’l-adwiyya al-mufrada (Summary book of the eleventh discourse of Galen’s Simple Drugs)*, currently part of a larger manuscript. Attributed to the early thirteenth century, the copy employs tabular structures to present names, properties, and usefulness of medicinal substances. Within the synoptic tables, text is executed on a diagonal plane to form chevron patterns (fig. 2.2)—identical to the treatises of the *Taqwīm* discussed above. As with the use of the title *Taqwīm* to signify tabular representation of information, one might consider whether the title of *jawāmi‘* might automatically designate the presence of diagrammatic structures; that is, the title may be dependent upon the organizational structure/s. This relationship between title and visual presentation might explain the predominance of diagrams (including tables) in the *Kitāb al-diryāq*.

The Bodleian copy of the *Jawāmi‘* includes a scribal note prior to the tabulated data that sheds light on the visual organization of the pages:

> I found seven chapters of the book, and so I decided to arrange them in branch-diagrams (*tashjīr*) and tables (*jadāwil*) so that the book would be a better abridgement, more worthy of being taken seriously, more attractive to see, easier to read and not so boring.[16]

In this context, the role of the compiler becomes crucial: not only collating the text, but also interpreting the material and making choices on how best to present the information

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[15] See Chapter 1 for *Kitāb al-diryāq* diagrams, and Section 2.2 and 2.3 for diagrams of the *Jawāmi‘ Iskandriyya*

[16] Oxford, Bodleian Library, Oriental Collections, MS Hunt. 600, fol. 19b (undated, twelfth-thirteenth century), quoted in Emilie Savage-Smith, “Ibn Baklarish,” 113. Savage-Smith mentions that the scribal note appears to have been present in the exemplar used by the scribe of the Bodleian copy.

visually, in a manner amenable the goals of the treatise. The scribe brings to fore the significance of the table in two ways: firstly, utilizing the table format in a manuscript brings credibility to the knowledge presented; in other words, the table format gave the work added value. Secondly, we glean from the scribal note that tables were not an afterthought; rather they were integral to the ways in which knowledge was conceived, interpreted, and presented to the readers. In addition to the tabular presentation, the *Jawāmi'* contain a variety of other visual tools for presenting material, including branch diagrams and squares of opposition (see section 2.2 for this discussion).

The categorization and comprehension of information in a rational grid-like manner was ostensibly appealing, with numerous variations in medieval treatises. For instance, the *Firdaws al-ḥikma* (Paradise of Wisdom) by 'Ali al-Tabari (d. 870), a medical treatise from the thirteenth century (British Library, Arundel Or 41), incorporates tabular arrangement inserted between narrative text.[17] In this treatise, the table has a title: it is described as *shakl* and *ṣūra al-shakl*—a term used in the *Kitāb al-diryāq* to label some of the diagrams (see Chapter 1). The 8x9 table employs text on a primarily vertical plane, including the table's title (fig. 2.3; see also Chapter 3 for discussions of this manuscript). Unlike the tables discussed thus far that monopolize the entire manuscript, the table here fills only part of the page and complements the prose text directly above it. The visual prominence of the table can be asserted by noting the compression of script in the last lines of the text (above the table), with the script eventually splaying into the margins to complete the sentence (see fig. 2.3). The role of the table is still the same: it

[17] For an overview of the treatise, see Max Meyerhof, "'Ali al-Ṭabari's '*Paradise of Wisdom*': One of the Oldest Arabic Compendiums of Medicine," *Isis* 16 (1931): 6–54.

captures the essential elements and forges relationships between them. In doing this, new knowledge is created. The methodology of breaking, dividing, and arranging information is not unique to medicinal treatises. Philosophy, which was intertwined with medicine in Late Antique Alexandria, employs similar tools that divide and sub-divide information (though not visually) to better articulate knowledge.[18] Scholars have also suggested that the tabular representations in medicinal treatises borrowed from the visual framework of works on astronomy.[19]

From the treatises illustrated so far, there is in the twelfth and thirteenth centuries, a system of visual organizational tools present in manuscript culture—tables being one of them—spanning the breadth of the Islamic lands. The brief survey of tabulated treatises allows for a few observations. First, the popularity of the tabular form is in its ability to categorize information and develop formidable relationships between entities. The intersection of line, space, and text makes these relationships explicit. Second, as the table form obviates excessive discursiveness in the text, the information is generally more concise. The geometric lines create order in the midst of an information barrage, making the material more comprehensible. Information is thus perceived as orderly, factual, and objective. The new materials (foreign drugs, new treatments, bodily parts) also become well-integrated into the ordered milieu of the manuscript by visually assimilating with the

[18] Pormann, "Medical Education," 429; for the influence of philosophy on medicine see also Oswei Temkin "Studies on Late Alexandrian Medicine I. Alexandrian Commentaries on Galen's *De Sectis ad Introducendos*," *Bulletin of the Institute of the History of Medicine* (1935): 405–30.

[19] Schacht, "Ibn Butlan"; see also J. S. Graziani, *Arabic Medicine in the Eleventh Century as Represented in the Work of Ibn Jazlah* (Karachi: Hamdard Academy 1980), 51. For manuscripts with tables related to astronomy, see *Kitāb ṣuwar al-kawākib al-thābita* (*Book on the Forms of the Stars*), BL Or. 5323 and Bodlein Library MS. Marsh 144. See also Nasir al-din Tusi's (d. 1274) rendition of Ptolemy's *Almagest*, Bodleian Library, MS Pococke 369.

rest of the material and comprehended using an identical classification system.[20] Third, tables are regarded as valuable visual tools. This can be seen from the tabular copies made for courtly circles. The scribal note from the *Jawāmi'* series further corroborates that the tabular format made the information appear more credible and authentic to its viewers. Lastly, the manuscript pages were a source of visual delight. The geometric lines of the table create a visual pattern on the page. This layout is augmented by the rendition of text in chevron patterns in copies made not only for the royal courts but also for the physicians themselves. Inscribing a word or a sentence along an angle certainly proves advantageous in grid-like tabular formats, allowing for added space within each cell. The pattern also adds depth and movement to the page, making it appealing for the viewer and the reader. Like the tabular form, the chevron patterns also create meanings, one that still awaits further scholarship.

2.2 Quadrilateral Diagrams

In addition to tables, square and rectangular diagrams are abundant in scientific manuscripts. In manuscripts relating to health and medicine, the geometric shape is employed to represent scientific principles. The shape is also incorporated in the domain of cartography to imagine spatial relationships, both of which will be examined in this section. The four-part medium of representation is particularly suited to the "Galenism" of Late Antiquity, that took at its core the relationships between the four humors of the human body (blood, phlegm, yellow bile, and black bile), their qualities (hot, cold, dry,

[20] For more on how new materials or multiple drug names were integrated into tabular forms see, Savage-Smith, "Ibn Baklarish," 127–9; and Oliver Kahl, "The Pharmacological Tables of Rhazes," *Journal of Semitic Studies* LVI/2 (2011): 367–99.

wet), and the four elements (air, water, earth, fire) of the world.[21] The quaternary system also included the four ages of life, the four seasons, and the four cardinal points.[22] This Galenism or humoralism was an integral component of medieval Islamic medicine, one where the human body (microcosm) and the physical world (macrocosm) were intimately connected.[23] As the examples in this section will illustrate, the "logic of the tetrad"[24] permeated across the medieval period, signifying a world order that not only integrated the human body and the material world, but also served as a didactic tool to explain diverse worldly phenomena.

Compared to the tabular arrangements seen in the previous section that constituted entire treatises, squares and rectangles are less pervasive. Within a given manuscript, there can be as few as two small diagrams embedded within the prose-heavy treatise, whilst others may present more. This difference in occurrence between tables and geometric shapes is because the latter fulfills a role that is ostensibly distinct from the laying out of factual information in cells—and as such, appealing to a certain set of disciplines. Nestled within prose texts, the shapes are often composed using line segments around which text is inserted; alternatively, the text itself is inscribed in the

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[21] "Galenism" was coined by Owsei Temkin. See Owsei Temkin, *Galenism: Rise and Decline of a Medical Philosophy* (Ithaca: Cornell University Press, 1973); and Vivian Nutton, "Humoralism," in *Companion Encyclopaedia for the History of Medicine*, ed. W.F. Bynum and Roy Porter (London: Taylor and Francis, 1993), 281–91. For its continuation in the medieval Islamic period, see Peter Pormann and Emilie Savage-Smith, *Medieval Islamic Medicine* (Washington D.C., Georgetown University Press, 2007), 9–15; for Byzantium, see Alain Touwaide, "Medicine and Pharmacy," in *A Companion to Byzantine Science*, ed. Stavros Lazaris (Leiden, Brill, 2020): 388–90.

[22] For a detailed analysis on Galen, see Rudolph Siegel, *Galen's System of Physiology and Medicine: An Analysis of His Doctrines and Observations on Bloodflow, Respiration, Tumors and Internal Diseases* (Basel: Karger, 1968); and Vivian Nutton, *Galen: A Thinking Doctor in Imperial Rome* (New York: Routledge, 2020).

[23] Pormann and Savage-Smith, *Medieval Islamic Medicine*, fig. 2.2.

[24] Touwaide, "Medicine and Pharmacy," 388.

form of a quadrilateral, negating the use of geometric lines; or can be seen as a combination of the two. Different organizational strategies are employed within the geometric shape including the use of smaller cells, written text in various planes within the shape, and the stretching or compressing of ligatures of the script as a mechanism for emulating the geometric plane. In particular, the use of a quadrilateral is predominant when forming multiple relationships between a set of elements. The four vertices of the geometric shape easily allow for four variant components of the data to be placed at either end, with the horizontal, vertical and diagonal elements of the quadrilateral indicating the interaction amongst component parts. These diagrams are generally known as squares of opposition.[25] Not being restricted by the four vertices, the quadrilaterals have also been manipulated to visualize relationships between more than four components. Normally, the geometric diagram is presented subsequent to the explication of the concept, the visual presentation aiding the scribe and the reader in comprehending the text in question. The diagram is usually present without a title, but the sentence preceding it makes explicit reference to the image using words such as *mithāl*, *shakl* or *ṣūra* (see the Chapter 6 for a detailed analysis on nomenclature). In addition to visualizing conceptual relationships, quadrilaterals can be harnessed in the imagining of spatial relationships in two-dimensional form. The following section will delineate some examples of the diverse ways in which this geometric figure features in manuscript culture: squares of opposition; enhanced squares of opposition; and enclosures. The first two typologies are prominent in texts on health and medicine, while the third type

[25] For a brief overview of the square of opposition, see Terence Parsons, "The Traditional Square of Opposition," The Stanford Encyclopedia of Philosophy, last modified April 12, 2017, https://plato.stanford.edu/archives/sum2017/entries/square/.

appears in world and regional maps. As with the tabular form, the interaction of line, space, and text fosters new relationships and knowledge, both of which can only be understood by examining the diagrams in detail.

2.2.1 Squares of Opposition

As suggested by the name, squares of opposition bring to fore the relationship of contrariety. The genesis of such a visual schema is in the domain of logic where elements of contradiction and connection were materialized in the geometric figure.[26] The four points on the plane provided an amenable medium to represent the logical pairs of affirmative-negative and universal-particular; relationships of connection, contradiction, and subalternation.[27]

Within Arabic manuscripts on medicine surveyed between the eleventh and thirteenth centuries, the earliest form of squares of opposition can be noticed in the eleventh- or twelfth-century *Jawāmi' Iskandriyya* (*Alexandrian Summaries*; BL Or 9202, dated 1050–1152 and tentatively ascribed to Baghdad). There are a total of three diagrams in this treatise (fol. 3v, 12v, and 21r), each taking up about a little under a quarter of a page (figs. 2.4 a, b, c).[28] The first diagram is constructed solely using text, while the other two employ line segments to inscribe the square. The diagonals in each of the three diagrams are formed by horizontally extending the ligatures at the point of

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[26] John Emery Murdoch, *Album of Science: Antiquity and the Middle Ages* (New York: Scribner, 1984), 62. For the intersection of philosophy (logic) and medicine, see also Pormann, "Medical Education." For squares of opposition in medieval Arabic logic see Saloua Chatti, "Logical Oppositions in Arabic Logic: Avicenna and Averroes," in *Around and Beyond the Square of Opposition. Studies in Universal Logic*, ed. Jean-Yves Béziau and Dale Jacquette (Basel: Springer, 2012), 21–40.

[27] Parsons, "The Traditional Square of Opposition."

[28] The folios measure 256 x 172 mm.

intersection, providing the illusion of intersecting linear segments. The changing style of the three diagrams illustrate the experimental nature of the compositions. The placement of the image within each of the folios also varies, with the first image inscribed at the top of the page and the last figure towards the end. This placement is determined by the close relationship between text and diagram in this manuscript, whereby the latter follows the textual explication of the subject matter with explicit reference to the visual aid that is to follow. The first image (fig. 2.4a) discusses the opinions of Greek physicians of antiquity, one of them being Hippocrates. The intersecting diagonals and the vertical line segments indicate points of connection, while the upper and lowers horizontal edges indicate the contradiction between elements. The second diagram (fig. 2.4b) illustrates the four primary qualities (hot, cold, moist, dry) along the four vertices, with the vertical and diagonal line segments demonstrating the positive correlation between these qualities and the four elements (air, water, fire, earth). The long edges of the diagram denote the lack of connections. The third diagram (fig. 2.4c) echoes the former in its presentation of the four qualities, but rather than mentioning the elements, it only signifies points of connection and contradiction. In all three of the diagrams, the connections are highlighted in the diagonal and the vertical sides, whereas the contrary positions are reserved for the top and bottom edges of the square.

The materialization of concepts and their relationships in the form of such geometric constructions remained popular in subsequent periods, as highlighted by a seventeenth-century copy of the *Jawāmi‘ Iskandriyya* at the British Library (BL Add MS 23407). The copy includes identical diagrams to those seen in the earlier BL manuscript; however, the diagrams resemble shorthand figures. For instance, fig. 2.5a (fol. 178r)

illustrates a square composition of the four qualities, where a single grapheme and an extended ligature are employed to represent text on the diagonal intersections of the shape. This image-like inscription of text highlights the ubiquity of the diagram and its familiarity amongst the learned, such that the scribe did not need explicitly to inscribe the connection. Another figure in the manuscript is preceded by an explanatory component that ends with the symbol of a square and its two intersecting diagonals, rendered in red ink (fol. 159r; fig. 2.5b). One can conjecture that such an image without the presence of text was sufficient for the scribe to communicate the relationships of opposition and connection; the scribe need not verbalize the associations.

Like the tabular form, the presence of squares of opposition in this manner within the *Jawāmi‘ Iskandriyya* is linked to the Late Antique schools of learning in Alexandria. A treatise in Greek of Galen's summaries (*On the sects*) dated between the thirteenth and fifteenth centuries (*Tabulae Vindobonenses*, Codex medicus graecus 16, Vienna) presents a square of opposition and branch-diagrams, which Beate Gundert explains as indication of its use in sixth-century Alexandria.[29] In her discussions, Gundert reproduces the diagrams, one of which is the square of opposition (see fig. 2.6). Peter Pormann compares both the presence of the square of opposition and the commonalities between the general content presented in the *Tabulae Vindobonenses* and that of the *Jawāmi‘ Iskandriyya*, to argue that there was a common tradition in Late Antique Alexandria from which the two treatises derive.[30] The prose content of the two manuscripts differs, including the content

[29] Beate Gundert, "Die Tabulae Vindobonenses Als Zeugnis Alexandrinischer Lehrtätigkeit Um 600 c. Chr.," in *Text and Tradition: Studies in Ancient Medicine and Its Transmission: Presented to Jutta Kollesch*, ed. Klaus-Dietrich Fischer et al. (Leiden: Brill, 1998), 91–144.

[30] Pormann, "The Alexandrian Summary," 9.

used for diagrammatic illustrations; the tradition of divisions and summaries, and illustrations in Late Antique Alexandria, however, can be easily applicable to the works in question.

These few examples illustrate that the square or the rectangle was a popular visual device in treatises related to Galenic medicine. As discussed in the previous section, medicine and philosophy were closely connected in the late Alexandrian tradition, not only through the common divisional strategies but also in content. The interconnected world order, intertwining medicine and philosophical thinking about the nature of the world can be traced back to Galen himself.[31] This connection is solidified in Late Antiquity, the period that has the most profound impact on medieval Islamic medicine.[32] In the words of the Late Antique Neoplatonist philosopher, David of Armenia (second half of the sixth century): "For it [philosophy] takes matter and form and, according to knowledge, produces the four elements, and from these, it produced similar parts and from similar parts, organic things and from these, human bodies."[33] David describes medicine as being inferior to philosophy, but the passage highlights that not only are the two categories (the physical world and the human body) connected, their division and operation also occur through similar mechanisms; that is, that the "logic of the tetrad" dominates Late Antique and medieval thinking about matter, the material basis of the

[31] See Aileen Das, *Galen and the Arabic Reception of Plato's Timaeus* (Cambridge: Cambridge University Press, 2020), 30–68; and Nutton, "Humoralism."

[32] Pormann and Savage-Smith, *Medieval Islamic Medicine*, 9–15. For the reception of Galen's texts and the impact of philosophical thought in Late Antiquity see Temkin, "Studies on Late Antique Medicine."

[33] Adolfus Busse, *Davidis Prolegomena et in Porphyrii Isagogen commentarium*. Commentaria in Aristotelem Graeca 18.2 (Berlin: Reimer, 1904), 40 II.10–21, quoted in Das, *Galen and the Arabic Reception*, 20.

physical world. This quaternary framework suggests that the quadrilateral diagrams in medicinal treatises are visualizing not only the humoral context; rather the shape is also a symbolic representation of the way in which the physical world and its component parts operated.

This idea is corroborated by the examples discussed in this section, where the square of opposition diagrams not only illustrate humoral pathology, but also philosophical arguments (as in fig. 2.4a). Further evidence of this symbolic representation is found in treatises on ophthalmology. The *Tadhkirat al-Kaḥḥālīn* (Memorandum for Oculists) by ‘Ali ibn ‘Isa (c. 940–1010) of Baghdad is one of the foremost manuals on ophthalmology written in the eleventh century, building on the works of Galen and the famed translator of the Graeco-Arabic translation movement, Hunayn ibn Ishaq (d. 873 or 877).[34] The work explicates the anatomy of the eye and its various diseases, both external and internal, together with its treatment.[35] One of the diagrams is the square of opposition, depicting the conditions of myopia, hypermetropia, and presbyopia. The copyist inscribes the quantity of the humour (greater or smaller) on the left vertices of the square and the quality of the humour (thin or thick) on the right edges. The quadratic composition visually illustrates the eye diseases by forging relationships between the quality and the quantity of the humour. The diagram that is visually identical to the ones seen in the *Jawāmi‘ Iskandriyya* (discussed above) is housed in the National Library of

[34] E. Mittwoch, “ʿAlī b. ʿĪsā,” in *Encyclopaedia of Islam,* Second Edition, accessed April 24, 2019, http://dx.doi.org /10.1163/1573-3912_islam_SIM_0512.

[35] Mittwoch, “ʿAlī b. ʿĪsā.”

Cairo (Egypt, Ms. Ṭibb Taymūr 100)[36] (fig. 2.7). The text is placed directly above the geometric lines to mirror the pattern. A near identical rendition is seen in the Chester Beatty Library, Ar. 4002 (fig. 2.8). Dated to the thirteenth century, the written text on this image does not follow the geometric lines—there is no such manipulation of script in this instance. The geometric square, however, is emphasized. As in the seventeenth-century *Jawāmi'*, can it be that the readers are already so familiar with such a diagram, that the shape itself (without the need for the text) is sufficient to highlight the concept? A copy at the British Library dated to the same period (BL Or. 5856) can further augment this hypothesis. While the figure in this treatise is executed with additional line segments, the copyist has altogether omitted the diagonal labels (fig. 2.9). The additional lines enclose the text along the perimeter, forming a border around the central square. The four elements of the eye's humour (thick, thin, large, small) are inscribed at the vertices on a diagonal place, which visually urges one to imagine the diagonals, particularly if one is familiar with the mental image of the relationships presented. It is likely that the copyist forgot to add the diagonals, as a sixteenth-century version of the treatise (McGill Library, 108940-448) illustrates an identical figure with the addition of the diagonal labels. Perhaps the ubiquity and pervasiveness of such an organizational method allowed the scribe to forego inscribing the diagonals.

There are a number of visual similarities in the squares of oppositions presented in the *Tadhkira* and the *Jawāmi'*: the use of a rectangular composition, the interplay of line and text, and the manipulation (or lack of) of script. In addition to this visual

[36] Reproduced in Murdoch, *Album of Science*, 68. Savage-Smith mentions this manuscript (Tibb Taymur 100) as being that of the *Jawāmi'* (The Summary of Galen's Book on diseases that occur in the eye) rather than the *Tadhkira*. The work is likely a collection of ophthalmological treatises.

sequence, commonalities appear in the content employed by the scribes. The use of the word *ijtam'ān* (joining/connection) and its negative *la ijtam'ān* are seen in both treatises to highlight the connections and contrariety inherent in the discussion of the four elements. Given the established schools of Alexandria in Late Antiquity and the likely genesis of the diagrams in the *Jawāmi'* to that period, it is likely that the figures composed by the scribe of the *Tadhkira* had access to the *Jawāmi'* images, or that they had a common source (either Arabic or Greek such as the *Tabulae Vindobonenses*). Examining the ophthalmological treatises from the larger lens of the quaternary framework suggests that, like the *Jawāmi'*, the square of opposition in the *Tadhkira* also conformed to the four-part mechanism by which the physical world operated; that is, the mechanism of good sight operated in a way analogous to the humoral mechanism of the body. While at first glance, the *Jawāmi'* and the *Tadhkira* appear to have no inherent conceptual or methodological correlation, both are actively participating in the medical worldview where the "logic of the tetrad" determines the conception of the physical world, the human body, and its component parts.

2.2.2 Augmenting the Square of Opposition

While quadrilaterals call for the representation of four distinct points and relationships between them, the medieval manuscripts also feature the geometric shape augmenting the number of relationships. The shape, layout, and foundation of these diagrams most clearly stem from the square of opposition, and the supplementary relationships are visualized through additional diagonal line segments. In doing so, the content can be summarized, abridged, amended, and reinterpreted through the form of a diagram. Most

often, the author will provide a narrative examining these relationships, ending with the presentation of the diagram as a tool for summarizing. Not surprisingly, the authors or the scribes that adapted the square of opposition were the ones already working with the tool. As such, augmented squares of opposition appear mainly in the copies of the *Tadhkira* and the *Jawāmi'*.

In two of the *Tadhkira* treatises examined, identical diagrams are presented to illustrate the relationships between ocular diseases and conditions of the eye. In the BL copy, Or 5856 (fig. 2.10), dated 1291, the passage prior to the figure reads: "and its form (*shakl*) is as follows."[37] In the Damascus treatise (fig. 2.11), the copyist precedes the illustration by noting that a "form (*shakalna*) of a table (*jadwal*) of sorts (*biqismihi*)" will allow for a more comprehensive understanding of the subject matter.[38] Both diagrams omit the use of line segments, constructing the geometric square shape only through the use of text. Unlike the earlier squares of opposition, the vertices lack the amplification through the labels, and each line segment (horizontal, vertical, diagonal) stands independently as a complete sentence. In addition to the four-line segments and the two diagonals, these diagrams have two additional lines of text, dividing the square into eight equal components. In terms of the content of the diagrams, each of the eight linear segments is comprised of conditional sentences, which discuss the state of the eye or vision given the humoral quality (humid/dry) of the environment or the eye itself, respectively. For instance, one of the lines read: "When the eye is dry in a single place,

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[37] Translated by author from BL Or 5856.

[38] Translated by author. Ali ibn 'Isa, *Memorandum Book of a Tenth-Century Oculist for the Use of Modern Ophthalmologists*, trans. Casey A. Wood (Chicago: Northwestern University, 1936), 207. I am currently unsure about the date of the Damascus treatise. The author of the translation does not seem to mention this.

the patient sees objects as through a window."[39] The inclusion of complete sentences with no apparent relationship to one another is a fundamental departure from the way that the square of opposition works. It remains to be understood why such a geometric shape was utilized to highlight ocular diseases. The discussion of humoral quality might reflexively signal the square of opposition as represented in the BL *Jawāmi'* (Or 9202). Alternatively, such visual aids could have been part of the learning/teaching methodologies, and the author/scribe selected the one most appropriate for the material. Lastly, perhaps one must not discount the innovation or creativity of the author and/or the scribe. Similar to the scribal note in the *Jawāmi'* discussed in the above section, the author may have selected an existing visual aid and adapted it to best represent a concept in a meaningful way.

The augmented square also appears in the treatises of the *Jawāmi'*—in particular the *Jawāmi'* of Galen's treatise on the Eye (*Jawāmi' Kitāb Jālīnuūs fi'l-amrād fi'l-'ayn*) at the Chester Beatty Library, MS 3425, dated 843 AH/1431 AD.[40] This treatise specifically presents numerous organizational illustrations, including branch-diagrams, eye-brain diagrams, along with the augmented square of opposition (fig. 2.12). Visually, the square diagram is similar to the one witnessed in the BL copy of the *Tadhkira* (Or. 5856) where the square is constructed using four lines of text, and four additional text segments intersecting at its center. However, compared to the BL manuscript where the script is transcribed in a manner conducive to reading, the scribe of the *Jawāmi'* conforms the text to the figure more intimately by depicting the sentences upside-down

[39] 'Ali ibn 'Isa, *Memorandum Book of a Tenth-Century Oculist*, 207.

[40] Savage-Smith mentions four extant copies of the *Jawāmi'* focusing on the eye. Savage-Smith, "Galen's Lost Ophthalmology," 131.

or in varied orientations, making it challenging for its readers to read the words without needing to rotate the pages or physically move themselves. In earlier folios of this manuscript, more angular depictions of branch-diagramming are presented, suggesting that the copyist of this *Jawāmi'* had access to a wide range of material, and made considerable effort to interpret the material in visual forms. While the content of the *Jawāmi'* square is not identical to the *Tadhkira*, two of the sentences, running vertically and horizontally along the center, have clear resonances. The structure of the sentences themselves, particularly the use of conditional elements can be seen across the two treatises. There is not enough evidence to determine whether such a visual aid was initiated by one of the Arabic treatises and then emulated in the others because of the common subject matter. Since both treatises find their origin in Galen, it is equally likely that Greek works on ophthalmology in Late Antiquity gave preference to such modes of representations, and the Arabic tradition built on the Greek diagrams. At the same time, might there be formidable relationships between the physical world and the human body, both of which are understood as composed of four basic elements and humours, and thus represented in a similar manner? Even though the primary aim of the augmented squares is the visualization of numerous combinations of data, the diagrams suggest that that scribe has retained the quadratic form to situate the new set of relationships within the medieval quaternary framework. In doing so, the diagrams are equal participants in the ordered structure and functioning of the physical world at large.

2.2.3 Quadrilateral Enclosures

As the previous section illustrated, the physical world through its four elements was intimately intertwined with the human body through its four humors. The framework also extended to the physical, spatial dimensions of the world, particularly the four cardinal points of directions.[41] As such, geographical drawings often incorporate a quadrilateral enclosure to delineate the four cardinal points. Like the squares of opposition, the drawings relating to geography are an attempt to visualize the physical and cultural realities. However, while the structure of the visual aid remains a quadrilateral, the copyist inserts layers of complexities in the form of either heavier text panels, additional shapes, and/or relationships. This section illustrates rectangular and square enclosures as signifying the spatial domains of the physical world, one that is intertwined with the humoral world in the medieval Islamicate world and beyond.

The shape of the earth in rectangular forms appears in the Late Antique and medieval Christian imagination, albeit less influential than the dominant circular form (for circular *mappaemundi* see section below). For instance, in his *Christian Topography*, Cosmas Indicopleustes (d. 550) describes the earth as an oblong, rectangular shape, its length twice as long as its width—the rectangular structure referring to the *oikumene*, the inhabited earth.[42] While this image does not prevail in the medieval imagination, the quadratic composition of the maps shifts the viewer's perspective and imagination, from a spherical entity at the center of a larger order, to one where the internal, spatial

[41] See also the article by B. L. Gordon who illustrates the four cardinal points as deriving from the symmetry of the human body. B. L. Gordon, "Sacred Directions, Orientation, and the Top of the Map," *History of Religions* 10 (1971): 211–2.

[42] For illustrations of the maps, see Maja Kominko, *The World of Kosmas: Illustrated Byzantine Codices of the Christian Topography* (Cambridge: Cambridge University Press, 2013).

configurations are articulated through an affiliation with a religious outlook.[43] Medieval Latin treatises also represent the world, or *mundus*, in a square form to illustrate its spatial parameters. When rendered as a square as opposed to the more prevalent circular form, the shape was often paired with labels of the four cardinal points and/or represented the elemental compositions of the world (earth-air-fire-water), as also seen in the Arabic treatises above.[44] In doing so, the square highlights the structure of the physical, material world where both the macrocosmic seasonal shifts and the microcosmic humoral pathology are embedded within its enclosure.[45] The geometric shape visually manifests the intimate relationship between the macrocosm and the microcosm in scientific and religious imaginations.

In medieval Arabic treatises, quadrilateral shapes also delineate world and regional maps. One of the earliest large-scale rectangular maps of the world (*ṣūrat al-arḍ*) is featured in the *Kitāb gharā'ib al-funūn wa-mulaḥ al-'uyūn* (*Book of Curiosities of the Sciences and Marvels for the Eyes*), copied in Egypt around the early thirteenth century (Bodleian Library, Arab c. 90, fol. 23a–b; fig. 2.13). The copy acknowledges the Fatimid dynasty, the Shi'a Muslim rulers of Egypt and North Africa from 909–1171,

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[43] For the limited reception and circulation of Cosmas, see also Maja Kominko, "The Christian Topography of Kosmas Indikopleustes," in *A Companion to Byzantine Illustrated Manuscripts*, ed. Vasiliki Tsamakda (Leiden: Brill, 2017), 395–406. For Cosmas and Byzantine maps, see O. A. W. Dilke, "Cartography in the Byzantine Empire," in *The History of Cartography*, Vol. 1: *Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean*, ed. J. B. Harley and David Woodward (Chicago: The University of Chicago Press, 1992), 258–75.

[44] Barbara Obrist, "Wind Diagrams and Medieval Cosmology," *Speculum* 72, no. 1 (1997): 63–4; and David Woodward, "Medieval Mappaemundi," in *The History of Cartography*, Vol. 1: *Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean*, ed. J.B. Harley and David Woodward (Chicago: The University of Chicago Press, 1992), 355–7, fig. 18.38.

[45] Obrist, "Wind Diagrams," 65. For medieval mappaemundi as integrating scientific, religious, and cultural imaginations see Woodward, "Medieval Mappaemundi," 286–370.

suggesting that the treatise may have originally been commissioned by one of the rulers.[46] The manuscript comprises two volumes: the first focuses on the celestial world; and the second on the terrestrial world. Of interest in this section are the square and rectangular forms employed for the world map and maps of the Mediterranean region—many of which are unique in the history of medieval cartography. In the double-page rectangular world map—that opens the volume on the terrestrial world—only the horizontal line, forming the upper boundary of the figure, is marked as the south side. The word *al-junūb* (south) is inscribed with a final ligature that is elongated to encompass the entire width of the line segment. The remainder of the sides are devoid of any markers, suggesting that one may be able to intuitively orient the spatial boundaries. The map itself is extensively labelled with place names and meticulously illustrated with symbols for landmarks and geological structures. This world map has been the subject of much interest amongst scholars for its rectangular framework and its mathematical scale, the graticule, located at the top of the figure. Both these features have allowed historians to place this map in the Late Antique tradition of mathematical astronomy.[47] The stylized depiction of land mass and water bodies, however, is executed in the tradition of the Islamicate geography active in the tenth century known as the Balkhi school, characterised by abstract and schematic representations (see also below and the next section for representations from the Balkhi

[46] Jeremy Johns and Emilie Savage-Smith. "The Book of Curiosities: A Newly Discovered Series of Islamic Maps." *Imago Mundi* 55 (2003): 8. For a complete translation and commentary of this manuscript, see Yossef Rapoport and Emilie Savage-Smith, *An Eleventh-Century Egyptian Guide to the Universe: The Book of Curiosities* (Leiden: Brill, 2014). See also Yossef Rapoport and Emilie Savage-Smith, *Lost Maps of the Caliphs* (Chicago: The University of Chicago Press, 2018).

[47] Rapoport and Savage-Smith, *Lost Maps*, 97.

school).[48] This hybrid attempt by the copyist, or his predecessor, to combine two traditions in the form of an image suggests the presence of multiple ideas and perspectives. As the map retains the Late Antique rectangular framework suggests that the world is being imagined in a microcosmic form, particularly as compared to macrocosm of the celestial world explicated in the first volume. This connection between the macrocosm and microcosm, particularly the influence of the planets and the stars on the terrestrial world, is both implied and made explicit by the scribe.[49] The placement of the map is also relevant in orienting the viewer. The rectangular map is presented as the very first image on the second book containing maps of the earth and its regions. Following the celestial world represented in the first volume that takes the form of circles and spheres, including in the representation of the earth, the rectangular map of the world invites the viewer to change one's perspective. The map signals a shift: from the celestial world to the terrestrial world. Doing so also suggests that the shape is aligning itself with the microcosmic world of elemental and humoral pathology that governs the physical world. After one is oriented to the earthly realm, the scribe also provides a circular world map (fol. 27b–28a), juxtaposing one with the other.

The *Book of Curiosities* also includes maps of three cities that take the quadratic form: Mahdia (fol. 34a), Cyprus (fol. 36b), and Tinnis (fol. 35b–36a). In the manuscript,

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[48] Rapoport and Savage-Smith, *Lost Maps*, 97. For an overview of the Balkhi school, see Gerald Tibbets, "The Balkhi School of Geographers," in *The History of Cartography*, Vol. 2: *Cartography in the Traditional Islamic and South Asian Societies*, ed. J.B. Harley and David Woodward (Chicago: The University of Chicago Press, 1992), 108–36. For more recent scholarhip see also, Zayde Antrim, *Mapping the Middle East* (London: Reaktion Books, 2018). Karen Pinto has coined a new term, KMMS, to denote the mapping tradition of this period, Karen Pinto, *Medieval Islamic Maps: An Exploration* (Chicago: University of Chicago Press, 2015), 59–77.

[49] Rapoport and Savage-Smith, *Lost Maps*, 29–74.

the scribe makes explicit mention that his constructions, particularly those relating to islands and coastlines, are not realistic or accurate.[50] Further iterations of maps in rectangular formations are depicted in another cartographic treatise, *Ṣuwar al-buldān* (Images of Lands), housed in the Bodleian Library (Oriental Collections, MS. Ouseley 373, dated Dhu'l-Qa'da 696/23 July–20 August 1297) and attributed to the Balkhi school. More generally, maps from the Balkhi school represented cities in a rectangular form, while world maps were illustrated in the circular.[51] Similar to the *Book of Curiosities*, all maps in the Bodleian treatise are oriented with south on the top (see section 2.3.3 for maps of the Latin west, where east is at the top of the figure). In the map of Greater Syria (fig. 2.14; labelled: *ṣūrat al-sham*), the copyist starts with a model of a four-sided polygon, wherein each of the vertices represents the four cardinal points. The diagram then incorporates circles, circular arcs, and line segments within the map to mark cities, seas, waterways, and mountain ranges. Savage-Smith notes the abstract quality of the images and attributes their lack of resemblance to the physical world to their function as mnemonic aids.[52] The rationale expressed by the copyist of the *Book of Curiosities* is applicable for these images as well, in that there was a deliberate attempt to geometricize the maps. By rendering the map in a straight and simple enclosure, the focus of the image becomes the numerous spatial relationships illustrated inside the figure. Through the

[50] Yossef Rapoport and Emilie Savage-Smith, "Medieval Islamic Views of the Cosmos: The Newly Discovered Book of Curiosities," *The Cartographic Journal* 41 No. 3 (2004): 254–5.

[51] Dionisius Agius, "Sea Zones: The Balkhi School's Conceptual Mapping of the Indian Ocean," *Topoi Orient Occident* (2017), 228.

[52] Emilie Savage-Smith, "Memory and Maps," in *Culture and Memory in Medieval Islam: Essays in Honour of Wilferd Madelung*, ed. Wilferd Madelung, Farhad Daftary, and Josef W. Meri (London: I.B. Tauris in association with The Institute of Ismaili Studies, 2003), 109.

rectangular shape, the scribe brings attention to the region of *Al-Sham*, rather than the relationship between *Al-Sham* and other geographic entities. The map is particularly intriguing as the quadratic enclosure is not explicitly depicted in the form of straight lines across the perimeter of the image; one must mentally imagine the two parallel lines across the west and east sides of the map.

Like the rectangular world map of the *Book of Curiosities*, the spatial configuration of the map of *Al-Sham* depicts travel itineraries and geographic structures that would have served as mnemonic aids for travelers. This feature of diagrams as an *aide memoire* in the medieval period also surfaces in anatomical illustrations, where the illustrations are featured in geometric constructions.[53] As is the case with the maps, the anatomical renditions take on an abstract form, straying far from naturalistic depictions. Savage-Smith contends that the abstract format of anatomical images was intended to present multiple perspectives of viewing.[54] Through these diagrams, the copyists juxtapose contrary positions and orientations which was the preferred mode employed for didactic purposes. The juxtaposing of perspectives is evident in a small diagrammatic image of winds from the treatise of *'Ajā'ib al-makhlūqāt wa-gharā'ib al-mawjūdāt* (*The Wonders of Creation and the Oddities of Existence*) of Zakaria al-Qazwini (d. 1283) at the British Library (BL Or 14140, early 14th C; fig. 2.15).[55] In this cosmographical

[53] Emilie Savage-Smith, "Anatomical Illustrations in Arabic Manuscripts," in *Arab Painting: Text and Image in Illustrated Arabic Manuscripts*, ed. Anna Contadini, Handbook of Oriental Studies. Section 1, the Near and Middle East, v. 90 (Leiden ; Boston: Brill, 2007), 147–59.

[54] Savage-Smith, "Anatomical Illustrations," 158. A similar case of multiple viewing perspectives in discussed in relation to Byzantine illustrations of antipodes. See Kominko, 78.

[55] The paintings of this BL manuscript are discussed in length by Stefano Carboni, *The Wonders of Creation and Singularities of Painting: A Study of the Ilkhanid London Qazvini* (Edinburgh: Edinburgh University Press, 2015). For a discussion of the 'wonder' genre and talismanic images in the medieval

treatise, the wind diagram is presented as a square, fitted with and circumscribed by a circle. The central circle depicts the earth. The absence of labels on the remaining two shapes suggests that the square illustrates an alternate perspective of the earth, as the four cardinal points are clearly indicated on the vertices of the shape. The direction of the winds also adopts a polygonal trajectory, framed by a circle. Given that winds were part of the meteorologic phenomena operating at the sublunary sphere, the final circle likely indicates the celestial world.

This section has examined the different manifestations of the square or rectangle shape in cartographical traditions. The examples illustrate the four-sided shape as symbolic of the physical world and its properties. The labels were often not required to communicate the Late Antique and medieval worldview that was informed by humoral pathology, elemental compositions, and cardinal orientations—the ordering of space implicitly signalling the four-part ordering of the world.

2.3 Circular Diagrams

Unlike the shape of the quadrilateral, which seamlessly lends itself to the representation of four components, the lack of endpoints in a circle contributes to endless divisions within the shape, allowing for a much-varied depiction and relations of ideas and concepts. While the quadrilateral illustrates positions of contradiction and opposition, circular diagrams have generally been employed to divide and classify information, or to make a series of points more visually pleasing to its viewers. And like the quadrilateral, circles delineate relationships between different elements. One way in which circular

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copies of the *'Ajā'ib al-makhlūqāt*, see Persis Berlekamp, *Wonder, Image, and Cosmos in Medieval Islam* (New Haven: Yale University Press, 2011).

diagrams are represented is the incorporation of concentric circles, which offers the flexibility to present as many or as few divisions or components of an idea. The second technique evident in the manuscripts is radial lines or spokes, which like the earlier method is amenable to its content. Lastly, the form of the circle was profusely incorporated for presenting cartographic knowledge; in this case, the shape of the circle resembling the shape of the inhabited planet and the medieval universe. The following sections will discuss examples of each of the three techniques.

2.3.1 Concentric Circles

The geometric form of a circle corresponds to the medieval Islamic understanding of a geocentric universe with spherical orbits, based largely on the works of the Alexandrian astronomer, Ptolemy (d. c. 165 AD).[56] In addition to two-dimensional illustrations in manuscripts, the focus of this section, three-dimensional objects such as astrolabes and armillary spheres also adopt the circular or spherical form.[57] More specifically, the use of concentric circles in charting the world provides access to elements of hierarchy and visualizes spatial relationships between the each of the represented components. Almost all of the diagrams employing concentric circles as a mode of representation relate in some way to astronomical or cosmographical ideas (for circles in Late Antique and Sufi

[56] For an overview of the sources that informed medieval Islamic astronomy, see Regis Morelon, "General Survey of Arabic Astronomy," in *Encyclopaedia of the History of Arabic Science*, ed. Roshdi Rashed (London and New York: Routledge, 1996), 1–19; and George Saliba, *A History of Arabic Astronomy: Planetary Theories during the Golden Age of Islam* (New York: New York University Press, 1994). For manuscripts of Arabic translations of Ptolemy, see Ahmet Karamustafa, "Introduction to Islamic Maps," in *The History of Cartography*, Vol. 2: *Cartography in the Traditional Islamic and South Asian Societies*, ed. J.B. Harley and David Woodward (Chicago: The University of Chicago Press, 1992), 10.

[57] For more on celestial mapping objects, see Emilie Savage-Smith, "Celestial Mapping," in *The History of Cartography*, Vol. 2: *Cartography in the Traditional Islamic and South Asian Societies*, ed. J.B. Harley and David Woodward (Chicago: The University of Chicago Press, 1992), 12–70.

philosophies see Chapter 4; for cosmographical representations in architecture see Chapter 5).

The Bodleian *Book of Curiosities* (discussed above), influenced in part by Ptolemy's *Geography*, presents a circular diagram in the initial pages of its treatise (fig. 2.16). The first book dealing with representations of the heavens and the cosmos includes a double-page diagram, with seven concentric circles to illustrate the earth, stars, constellations, and the zodiac. Inscribed in a combination of red and black ink, the innermost circle depicts the earth, which is subdivided into seven horizons. The outermost circumference portrays the names of the twelve zodiac signs on the outer edge, as well as pointing out the eastern and western points. The inner circles present a series of star names, constellations, and their corresponding images in the form of dotted patterns. Apart from the outermost text where ligatures are elongated to mimic the circumference, much of the text is placed within delineated cells. This circular diagram in its entirety, particularly the use of dotted patterns, is reminiscent of geomantic wheels, evident in the British Museum's thirteenth-century device (see Chapter 4 for a detailed discussion on this object).[58] In discussions of this manuscript, Jeremy Johns and Emilie Savage-Smith note that the first part of the book, which is where the diagram appears, illustrates content primarily associated with astrological and divinatory materials, with little relevance to ideas of mathematical accuracy.[59] The description of lunar mansions, which forms the majority of the first book, was used for the prediction of rain amongst other atmospheric

[58] BM 1888,0526.1

[59] Johns and Savage-Smith, "The Book of Curiosities," 9.

conditions.[60] The book's content suggests that such circular patterns served as devices for divination practices. More importantly, the multiple circular representations indicate the circular structure and motion of the heavens and the earth.

Two other diagrams in the manner of concentric circles appear in this first section of the *Book of Curiosities*. The first of these demonstrates the relationships between the twelve zodiac signs and the five planets (Mercury, Venus, Mars, Jupiter, and Saturn); the orbits of the five planets taking the form of five concentric circles (fig. 2.17). The final diagram in this book presents a wind diagram, composed using two concentric circles and a twelve-pointed star between them; the latter formed using four triangles (fig. 2.18). The inner circle is labelled as "the earth," while the outer circle presents the zodiac names demarcated by the vertices of the star.[61] An examination of these diagrams reveals that, in general, a circle, and the innermost circle represents the earth. The universe and the celestial world take the form of larger circles.[62]

In the British Library treatise devoted to cosmology, *'Ajā'ib al-makhlūqāt* (BL Or. 14140, c. 1300), also discussed in the previous section, the first chapter opens with a discussion on the celestial world, and its representation in the form of spheres. The accompanying diagram is composed using thirteen concentric circles (fig. 2.19). The innermost circle is labelled the "center of the earth" (*markaz al-arḍ*); this image of the earth in the center is consistent with depictions noticed in manuscripts discussed earlier.

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[60] Rapoport and Savage-Smith, *Lost Maps*, 29–74.

[61] For twelve-part wind diagrams in manuscripts of the Latin West, see Obrist, "Wind Diagrams," 33–84.

[62] For similar conceptions of the universe in Latin West, see Barbara Obrist, *La Cosmologie médiévale: Textes Et Images* (Firenze: Edizioni del Galluzzo, 2004); for the Byzantine world, see Dilke, "Cartography in the Byzantine Empire," 266–74.

Moving outwards, the first four circles are the spheres of the elements; that is the sphere of the earth, water, air, and fire respectively. The following seven circles are not provided with specific names, but take on the labels of sphere one through sphere seven. In the preceding paragraph, the author narrates that in this "first image" (*awal ṣūwar*), one will see "the spheres and its forms" (*aflāk wa ashkāluha*). The last sentence of this paragraph acts as a title for the image, reading: "and this is its image" (*wa hadha ṣūratihi*). The author uses the term *ṣūra* to describe the image in its entirety, but the word *shakl* indicates the spheres themselves; that is, the geometric form of each circle (see also Chapter 6 for a discussion on nomenclature).

The Munich copy of the same treatise (Staatsbibliothek, cod. Arab. 464, c. 1280) employs concentric circles to illustrate a calendric wheel (fig. 2.20). Ten concentric circles and twelve spokes form the image, with the text enclosed in the subdivisions created. The text is inscribed along the circular arcs and mimics the circular images, rather than radiating into the center, as seen in the earlier section. The outermost circle presents the twelve months of the Muslim calendar, starting with al-Muharram at the very top of the circle and moving anti-clockwise. The remainder of the cells in the diagram are filled with the days of the week. The diagram was a tool to assist in identifying the first day of each month. According to the preceding text, the use of such a diagram facilitated a simpler method of computing the days, saving laborious calculations.[63] In this diagram, one can witness a practical application of a circular motif. A reader wishing to inquire about the beginning day of the month first identifies the month on the outermost circle, and then proceeds to move inwards based on certain calculations. The text preceding the

[63] The image is illustrated and discussed in Murdoch, *Album of Science*, 57.

diagram also uses the words, *shakl* (form) and the word *dā'ira* (circle) to describe the image. The image of the concentric circles and the twelve months of the year aligns with some of the cosmological diagrams discussed earlier. The visual resemblance suggests that the reader may intuitively be able to associate the center of this image as being the center of the earth, the circular arcs mimicking planetary orbits, and the twelve divisions akin to the twelve zodiac signs (for more on visual metaphors see Chapter 6).

This section has illustrated a few examples from the Arabic manuscript tradition to highlight that the diagram of concentric circles was characteristic of the earth, the universe, and its orbits. Moreover, the popularization of the universe in this circular image makes it amenable to depict ideas and knowledge forms that intrinsically associate with the spherical world order, such as in the examples of the calendrical wheel and the *Book of Curiosities*.

2.3.2 Radial Lines/spokes

The primary difference between the divisions created using concentric circle and radial lines is the element of hierarchy. Like concentric circles, radial lines—lines drawn from the center of a circle to a point on its circumference—allow for numerous subdivisions in the circle. There can be as few as two radii to divide the circle into two parts. As the number of divisions within the circle increase, the surface area available between each of the components decreases. Text is then inscribed either in the spaces between the radial lines or directly above them or supplants the geometric lines altogether. Depicting content in such a manner defies any elements of a hierarchy, wherein each radial line, and respectively the content it represents, is visually seen as equal to the next. This manner of

illustration was conducive to presenting multiple strands or variables in a non-hierarchical scheme.

In Ibn Butlan's *Taqwīm al-ṣiḥḥa* (Almanac of Health) a circular diagram is incorporated at the very beginning of the epitome to present the table of contents. This diagram consists of about 46 spokes, with text inscribed between each. In the treatise BL Or. 1347, dated to 610 AH/1213 AD,[64] the diagram is composed using four concentric circles; two of the circles are closer to the circumference and a final small circle is placed at the center (fig. 2.21). The divisions created by both, the radial lines and the concentric circles, enables the distribution of information. The textual content of this table of contents is as follows: the outer-most circle is the reference number for the medicinal substance in-text, the second corresponds to the table number, and the longest space is reserved for the title of the table. The titles flow in a clockwise manner and inwards from the outer edge, with some of the entries depicted upside-down for the reader. No apparent sense of hierarchy is evident visually, but the diagram is labelled with table numbers that instinctively alert the reader to an impending order. If the user is to navigate the manuscript using the table of contents, as in an encyclopaedia, why must the scribe use a circular diagram to lay out the contents? A tabular mode of presentation would likely be more suited to display a list of the tabular contents of the manuscript. In this circular presentation, both the reader and scribe would need to physically rotate the book in order to be able to read and inscribe the text. Despite this impediment—or perhaps due to it—the scribe chooses to include a circular diagram, creating an embodied and prolonged engagement with the viewer or reader. Such encounters between image and viewer are

[64] Date provided in the colophon.

resonant of the circular inscriptions in magical objects, monumental inscriptions, and coins, where the form takes visual precedence over the verbal content. In doing so, the verbal messages are shaped by the circular framework (see Chapters 4 and 5).

This princely manuscript presents the figure in a full-page rendering, buttressed by its enclosure within an octagonal structure, the addition of a title, and intricate patterning of the background space. The title of this diagram uses a gilded thuluth script encased in a rectangular frame, reading: "*ṣūrat al-zāʾirja*" (image of a *zāʾirja*). The *zāʾirja* is a divinatory technique where a circular table is used to provide portents and predictions, and is closely aligned with magic and astrology[65] (see also Chapter 4). Written literature and visual examples of the *zāʾirija* are pervasive after the thirteenth century, and the concept is considered to have been invented and is detailed by al-Sabti (d. 1298?) in *al-Risāla al-sabtiyya fi'l-zāʾirja*.[66] The diagram in the BL treatise was produced slightly earlier than al-Sabti, and it is likely that the concept of *zāʾirija* was either much broader in its interpretation, or that the circular diagram in Ibn Butlan's copy was an early iteration of the practice of divination in intellectual and princely circles. Noteworthy in the folio is also the embellishment of the innermost circle in the diagram that encloses an eight-sided star, aimed to complement and mirror the outer octagon (for stars and octagons in magic, see Chapters 3 and 5).

A fourteenth-century copy presents a similar circular diagram (AKM 516, dated to 1344), highlighting the significance of the geometric form as a preface to the content. The diagram preserves the use of 46 spokes with some variation; two table titles seen in

[65] T. Fahd and Anne Regourd, "Zāʾirdja," in *Encyclopaedia of Islam,* Second Edition, accessed February 24, 2020, http://dx.doi.org/10.1163/1573-3912_islam_COM_1376

[66] Fahd and Regourd, "Zāʾirdja."

the previous copy are missing, and two additional items are inserted, including the mention of "*al-tiryāq*" (the theriac [note that this is an alternative spelling of *diryāq*]), which has not been seen before. The consistency of the circular form in several copies of Ibn Butlan suggests that the image was deemed worthy by the scribe or communicated something meaningful to his audiences. I propose that the circular image of Ibn Butlan's table of contents served as a cosmic prelude to the medicinal content of the treatise for several reasons. First, in the medieval imagination, the circle was synonymous with the representation of the earth and the cosmic spheres, as several examples in the previous section have illustrated. Second, the Galenism that permeated Islamic thought intimately links the terrestrial and celestial worlds. In this relationship, the celestial bodies and their movements were directly connected to and affected the workings of the human body.[67] Diseases, their causes, and their remedies could be explained through an understanding of cosmic patterns and rotations. This binding relationship between the two is particularly pronounced in medieval Arabic literature where authors such as al-Tabari (discussed above), justify their astrological claims by linking them back to Hippocrates, the Greek physician who initially formulated humoral theory: "the wise man Hippocrates said that astrology is not a small part of the science of medicine."[68] The interrelationship between medicine and the cosmos was discussed both by physicians as well as astrologers, both of whom aspired to find the ultimate cause of the diseases.[69] Physicians such as Ibn Butlan,

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[67] Pormann and Savage-Smith, *Medieval Islamic Medicine*, 43.

[68] 'Ali b. Rabban al-Tabari, *Firdaws al-ḥikma fī l-ṭibb (Paradise of Wisdom)*, ed. M. Z. Siddiqi (Berlin-Charlottenburg, 1928), 541 quoted in Liana Saif, "Between Medicine and Magic: Spiritual Aetiology and Therapeutics in Medieval Islam," in *Demons and Illness from Antiquity to the Early-Modern Period*, ed. Siam Bhayro and Catherine Rider (Leiden: Brill, 2017), 316.

[69] Saif, "Between Medicine," 314–5.

‘Ali ibn Ridwan (d. 1068), and Ibn Ithirdi (fl. c. 12th C), have also acknowledged the influence of the cosmic bodies on the health of man.[70] Lastly, the innovative tabular forms used in Ibn Butlan’s treatise specifically (discussed in 3.1 above) have been noted by several scholars as one adopted from astronomical treatises because it was visual tool “familiar” to the medieval audience.[71] If that is indeed the case, the circular representation is an image popular in astronomical treatises as indicative of the cosmos. The scribe employing the circular image in Ibn Butlan’s treatise would have therefore been familiar with this reference. The intertwined medieval framework of medicine and the cosmic world suggests that this relationship need not be made explicit through verbal content. I suggest, therefore, that the circular framework of Ibn Butlan’s copies were an implicit acknowledgement of the cosmic world in the realm of health and medicine.[72]

A similar case can be argued for the radial diagrams in the *Jawāmi‘* of Galen’s treatise on the Eye (*Jawāmi‘ Kitāb Jālīnūs fi’l-amrād fi’l-‘ayn*). The earliest of these from the St. Petersburg Library (Institut narodov Azii, MS C 875), was copied between 545–554 AH/ 1151–1160 AD. In this treatise, a circular diagram with radial lines presents a series of ocular disorders.[73] The manuscript from Cairo (Dār al-Kutub, MS Ṭibb Taymūr 100) is a direct copy from the St. Petersburg version, as stated by the scribe in the initial pages.[74] The copy is dated to 592–594 AH/1195–7 AD and page 7 depicts

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[70] Martin Levey, “Some Eleventh Century Medical Questions Posed by Ibn Butlan and Later Answered by Ibn Ithirdi,” *Bulletin of the History of Medicine* 39, no. 6 (1965): 503.

[71] Schacht, “Ibn Buṭlān.”

[72] See also a similar discussion in a recently published article, MacMurdie, “Proven Recipes,” 344–7.

[73] Savage-Smith, “Galen’s Lost Ophthalmology,” 131.

[74] Savage-Smith, “Galen’s Lost Ophthalmology,” 131.

the circular diagram with radiating text (fig. 2.22). This diagram is a slight departure from the Ibn Butlan series; here the scribe utilizes only one circle and sixteen radii. The text is placed directly above the spokes (rather than between them) and on the outer edge of the circumference. In mimicking the geometric shapes, the letterforms and ligatures of the script are elongated and compressed as dictated by the circle and the linear segments. Through this figure, the scribe describes ten conditions of the eye; two of these are placed around the circumference and the remainder eight span the diameter of the circle. The ocular diseases presented in the diagram are in the form of conditional statements (seen in Section 2.2 as square representations). For example, one of them reads: "If the humour turns yellow, the person will see nothing apart from yellow." The two components of the conditional statements are inscribed on either end of the circle's diameter. This manner of depicting information appears to visually show the top half of the circle with spokes radiating inwards, while the bottom half has text moving away from the center. With such content, there is no chronological pattern. One might conjecture that the use of a circle may be representative of the shape of the eyeball (as an orb), both the iris and the pupil presenting a concentric and radial view of the world. Alternatively, the evidence also leads me to suggest that the circular pattern exhibits the variety of ocular conditions within a cosmological framework. Recent scholarship of Aileen Das illustrates the significant role of Plato's *Timaeus*—a treatise on the ordered creation of the universe—on the writings on Galen, as well as later Islamicate physicians and philosophers, such as Hunayn ibn Ishaq, who was instrumental in the translation of Galenic treatises. Das argues that Galen and Hunayn's writings reveal an inextricable connection between the eye and the human body and the eye and the cosmic world. As in *Timaeus*, Hunanyn

articulates the eye as a microcosm—in structure and function—which can serve as a lens to investigate the natural and cosmic world.[75] In the writings of Plato and Galen, the eye is described as the "most divine organ" and ophthalmologists are "stakeholders in cosmic knowledge."[76] I suggest that the circular form utilized by the scribe conforms to this cosmic worldview, visually attuning the viewer to the familiar, ordered, Ptolemaic form.

2.3.3 Circular Enclosures

Like its cosmological counterpart, cartographical traditions employed circular enclosures to delineate the geography of the world. This section will look at a few examples from the medieval Islamic regions and the Latin West to illustrate the geometric shape as indicative of the world in scientific and popular imagination. The earliest extant representations of the world map as circular entities in the Islamicate world are from a series of maps collectively known as the Balkhi school or the Atlas of Islam.[77] An early copy dated to 1086 AD is from the work of Abu al-Qasim Muhammad ibn Hawqal in a manuscript copy entitled *Kitāb ṣūrat al-arḍ* (*Book of the Image of the World*), housed at the Topkapı Saray Museum Library. The image of the world map (fig. 2.23) employs two concentric circles forming a ringed border to enclose the component parts of the map. This circular ring represents the "Encircling Ocean (*baḥr al-muḥīṭ*)," indicated by its darker colour.[78] The water bodies featured within the circular composition are similarly

[75] Das, *Galen and the Arabic Reception*, 75–82.

[76] Das, *Galen and the Arabic Reception*, 81, 100.

[77] See footnote 48 above for the Balkhi school.

[78] For the "Encircling Ocean" in Greco-Roman and medieval European representations, see Pinto, *Medieval Islamic Maps*, 113–46.

distinguished through colour. The negative space inside the circle includes primarily cities and regions. Most striking in this early map is the outer rectangular enclosure that employs script to delineate the four cardinal points—an image redolent of the *Kitāb al-diryāq* (see Chapter 1). The map presents two perspectives: the first is the circular view of the earth; and the second is the quadratic projection where the four-part earth aligns with the "logic of the tetrad."

From the same mapping tradition, the *Kitāb al-masālik wa-mamālik* (Book of Routes and Realms) dated 1272–3, presents an identical image of the world (fig. 2.24).[79] The circular ring, the water bodies, as well as the indication of cities and landscapes in this map is more sophisticated, with a greater emphasis on geometry. Karen Pinto traces the visual evolution of Islamicate maps, emphasizing the transition from mimetic depictions to more stylized versions, especially in the twelfth and thirteenth centuries.[80] Both Pinto and Savage-Smith have highlighted the reading of such maps less as mimetic representations of geography, but rather as mnemonic tools related to travel and more generally, as images that characterize the medieval perception of the world; in other words, the maps are diagrammatic rather than representational.[81] The formidable links between geometry (the circle in this map) and the abstract (rather than mimetic) nature of maps can be associated with ways of thinking about the world. Most pertinent of these features and relevant to this discussion is the "Encircling Ocean," represented by the

[79] Another identical image, this time with an outer quadratic script border is found in al-Istakhri's *Kitāb al-masālik wa-mamālik* dated 589/1193 at Leiden University Libraries Cod. Or. 3101, fols. 4–5. Pinto, *Medieval Islamic Maps*, fig. 1.1

[80] Pinto, *Medieval Islamic Maps*, 66–73.

[81] Savage-Smith, "Memory and Maps"; and Pinto, *Medieval Islamic Maps*, 1–7.

circular ring. This image, of the circular world surrounded by an encircling enclosure, is not restrictive to the Islamicate imagination; rather the image is paradigmatic of global historical traditions of representing the world.[82] Moreover, the image surfaces in popular imagination—ceramic bowls from Samarkand in the tenth century with encircling script and the circular plan of the city of Baghdad have been noted for their alleged associations with cartographic images and cosmological representations.[83] The terrestrial and celestial worlds embrace in the circular image. The abstract and the iconographic nature of the circular world map can also be seen through its visualization in the form of animals, as depicted in a tenth-century bowl from Iran (fig. 2.25). Contained within the circular enclosure, the shape of the bird is interpreted as representing the lands of Africa, Europe, and Asia.[84] The practice of identifying with the abstract and distending the imagination, as well as the conflation of scientific and popular representations, are important ways of thinking about images and their function in societies.

The circular image, particularly the ringed outer border was equally predominant in the medieval European imagination, representing the encircling ocean in the so-called *mappaemundi*. Often depicted in the T-O format, the O illustrating the ocean also embodied Christian interpretations of the creation and likeness of the world—a combination of Neoplatonic thought and Christianity (for more on Neoplatonism, see Chapter 4).[85] Like with the Ibn Hawqal treatise discussed above, the circle is oftentimes

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[82] Pinto, *Medieval Islamic Maps*, 79–112.

[83] See Pinto, *Medieval Islamic Maps*, 147–86.

[84] Agius, "Sea Zones," 229.

[85] The most famous example is of the Psalter map, British Library Add MS 28681. See Heather Wacha and LauraLee Brott, "Reframing the World: The Materiality of Two Mappaemundi in BL, Add. MS 28681," *Imago Mundi (Lympne)* 72, no. 2 (2020): 148–62.

found in combination with square representations in medieval Latin manuscripts. As seen in the previous section, the earth (*mundus*) is not restricted to the circular form and can take the shape of a square or a rectangle, most prevalent between the ninth and the eleventh centuries. However, the two shapes were not always imagined as oppositions and have on several occasions be employed together. An eleventh-century "image of the world" in a Latin manuscript at St. Maxim in Trier (Trier, Stadbibliothek MS 1084/115 4, fol. 99r.) features the T-O style earth as the central image surrounded by a square to emphasize the four angles and elements of the world.[86] An earlier ninth-century image does the reverse: the "image of the world" diagram from a miscellany at the Cologne Cathedral Library, MS 83 II, fol. 84r, employs a quadratic figure to represent the earth at the center of the image (the four segments indicating the four elements: fire, water, earth, air), enclosed within a circle composed of concentric circles, the entire image bound by a square shape. Such diagrams highlight both, a sense of negotiation as well as a reconciliation between the circle and the square. Keith Lilley argues that this combination of images is of cosmological significance and plays a large role in the conception of medieval cities.[87] Circular forms of presenting the world, both in the medieval Islamic and European imagination, thus convey a medieval worldview that was less concerned about mimetic representation of the world; rather the geometric form was capable of absorbing symbolic significance, merging scientific exercises with religion and the popular imagination.

[86] Reproduced in Obrist, fig. 18.

[87] Keith Lilley, *City and Cosmos: The Medieval World in Urban Form* (London: Reaktion Books, 2009), 31–3.

Conclusion

The materials discussed in this chapter demonstrate that the geometric diagrams of the *Kitāb al-diryāq* are part of the larger tradition of visualization in the Late Antique and medieval period. Tabular forms, quadratic images, and circular arrangements—involving script and shape—are replete in scientific manuscripts especially dealing with health, medicine, astronomy, cosmography, and cartography. Other patterns, such as the chevron, octagons, circle-in-square, are also visual devices not unique to the *Kitāb al-diryāq* and equally present in the medieval treatises.

In addition to the prevalence of diagrammatic structures in the medieval period, the conflation of script, line, and space constitute semantic value, shaping knowledge formation and viewer perception. First, by organizing information in delightful patterns, the scribe is forging relationships among varying entities. Such relationships are evident in synoptic tables popular in treatises on health and medicine, where each of the drugs is explicated according to the set of headers placed at the top of the page. In quadrilateral diagrams, the four edges of the shape and the diagonal intersections are indicating points of connection or contradiction. Circular diagrams serve as tools for division and classification: concentric circles indicate hierarchies dominant in astronomical and cosmographical works, whereas radial lines depict a non-hierarchical approach, such as in Ibn Butlan's table of contents. Line, space, form, and text are instrumental in forming and sustaining these relationships.

Second, the geometric shapes are culturally embedded with ways of organizing and imagining the world. The quadrilateral and circular arrangements become symbolic of the world order and the geometric medium is harnessed to craft alliances between the

terrestrial and celestial worlds. The square or rectangle, for instance, represents the physical world through the four elements and the human body through the four humors, the latter dependent on the former. The popularity of the four-part system allowed for it to be used in diverse settings, the shape itself referencing the organizing structure. The circular image, on the other hand, is symbolic of the cosmos and its component parts, including the geocentric earth, and the spherical orbits. Mapping traditions during the medieval period are particularly intriguing as they depict both quadratic and circular representations of the earth as part of the same image. This juxtaposition of shapes illustrates multiple perspectives of ordering and imagining the world.

Lastly, the diagrams create a sense of visual order and stability on the page. The placement of text, the organization of space, the planes, and the arcs combine and stabilize data in a way that transmits and mobilizes knowledge.[88] The shaping of text facilitates the viewer's engagement with the content, the geometric entity being instrumental to defining the viewer's worldview. Diagrams are an exercise in value judgement, the author or the scribe highlighting important ideas, forging connections, and implicitly creating alliances between ordered forms of knowledge. The next three chapters will examine how the world orders manifested in quadrilateral and circular shapes are harnessed in materials relating to magical knowledge.

[88] For a discussion of documentary practices as epistemological tools, see also Liam Young, *List Cultures: Knowledge and Poetics from Mesopotamia to BuzzFeed* (Amsterdam: Amsterdam University Press, 2017), 45–8.

Chapter 3 Encountering the Forces: Quadrilaterals and Polygons in Magical Materials

This chapter (and Chapter 4) examines geometric shapes in materials related to magic to demonstrate the cultural meanings embedded within the patterns. Magic, in this dissertation, is defined as the control over or access to hidden forces and knowledge (see Introduction for a discussion on the definition of the term). In medieval Islamicate societies, magic plays a significant role. The Arabic word for magic, *siḥr*, has an extensive set of meanings, from enchantment and fascination, to eloquence, deceit, and an embellishment of the truth.[1] The term also encapsulates a wide number of applications, including poetry and beautiful calligraphy that elicit awe and wonder, supernatural healing, and the invocation of demons and spirits.[2] In the Qur'an, *siḥr* is mentioned several times, often with a negative association and can be translated as witchcraft, sorcery, or bewitchment. The term is generally employed in opposition to religion, referring to *siḥr* as affecting those who do not possess a sound mind.[3] However, even within the Qur'an, there are no clear guidelines or models that provide a unified definition for the term. The nebulous category lends itself to a wide variety of interpretations about which ideas, practices, beliefs, and rituals can be regarded as *siḥr*.

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[1] Edward William Lane and Stanley Lane-Poole, *An Arabic-English Lexicon* (Beirut: Librairie du Liban, 1980), 1316–8.

[2] Emilie Savage-Smith, "Introduction," in *Magic and Divination in Early Islam*, ed. Emilie Savage-Smith (Aldershot: Ashgate, 2004), xiii.

[3] Elsaid Badawi and Muhammad Abdel Haleem, "س/ح/ر s–ḥ–r", in *Dictionary of Qurʾanic Usage*, ed. Elsaid M. Badawi and Muhammad Abdel Haleem, accessed September 25, 2021, http://dx.doi.org/10.1163/1875-3922_dqu_SIM_000790. See also Gabriel Mandel Khan, "Magic," in *Encyclopaedia of the Qur'an*, ed. Jane Dammen McAuliffe, accessed October 10, 2021, http://dx.doi.org/10.1163/1875-3922_q3_EQSIM_00270.

Hadith literature (accounts of Prophet Muhammad's sayings), theologians, and judicial authorities also waver on practices classified as permissible or prohibited under the rubric.[4] For instance, charms and spells (*ruqya*) employed for the evil eye, fevers, and poisons were deemed acceptable, and were claimed to have been sanctioned by the Prophet for the purposes of healing or benefitting the individual.[5] Similarly, prestidigitation and illusions (*nīranj*) and objects imbued with celestial powers, that is talismans (*tilsam*), fell under the category of licit magic in the medieval period.[6] The prevalence of material culture inscribed with magical vocabulary such as words and passages from the Qur'an, science of letters (*'ilm al-ḥurūf*) and letter magic (*sīmiyā'*), magical alphabets, magic squares, and zodiacal motifs, demonstrate that magic was widespread in the medieval period and rarely in contention with religion (see Glossary and sections below for details);[7] rather, the materials largely served as a positive device that allowed individuals and societies to comprehend and face life's uncertainties. The widespread nature of magical practices would have likely prompted Ibn Khaldun (d. 1406), the fourteenth-century historian, to devote a substantial portion of his treatise on

[4] Edgar Francis, "Magic and Divination in the Islamic Middle East," *History Compass* 9/8 (2011): 623.

[5] Toufic Fahd, "Rukya" in *Encyclopaedia of Islam,* Second Edition, accessed September 24, 2021, http://dx.doi.org/10.1163/1573-3912_islam_SIM_6333.

[6] Toufic Fahd, "Nīrandj" in *Encyclopaedia of Islam,* Second Edition, accessed September 24, 2021, http://dx.doi.org/10.1163/1573-3912_islam_SIM_5922; and J. Ruska, B. Carra de Vaux, and C.E. Bosworth, "Tilsam" in *Encyclopaedia of Islam,* Second Edition, accessed September 24, 2021, http://dx.doi.org/10.1163/ 1573-3912_islam_SIM_7553.

[7] Venetia Porter, Liana Saif, and Emilie Savage-Smith "Medieval Islamic Amulets, Talismans, and Magic," in *A Companion to Islamic Art and Architecture*, ed. Finbarr Barry Flood and Gülru Necipoğlu (Hoboken, NJ: Wiley Blackwell, 2017), 533–42.

denouncing the various forms of magic.[8] According to him, magic is "the capacity of human beings to influence the world of elements by supernatural means. This may be done with or without the help of supernatural powers"[9] (see Chapter 2 for the world of elements). In his writings, the author explicates the different forms of magic, including astrology, letter magic, and divination, and evaluates the permissibility and efficacy of each, with the goal of refuting magic and the occult sciences.[10]

In addition to material culture, magical texts also proliferated in the medieval Islamic period, many of which built on Hermetic and Neoplatonic frameworks that dominated Late Antique thought.[11] Between the ninth to the thirteenth centuries, theories on astrology and astral magic were prominent features of medieval Islamicate intellectual thought. The theories articulate magic as harnessing the hidden (or occult) forces and powers already present in nature.[12] The occult was perceived as an extension of natural philosophy, forging relationships between the astral and the terrestrial world (see also Chapter 2 for the interconnected medieval structure).[13] The Late Antique Neoplatonic

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[8] See also Robert Irwin, *Ibn Khaldun: An Intellectual Biography* (Princeton and Oxford: Princeton University Press, 2018), 118–42.

[9] Mushegh Asatrian, "Ibn Khaldun on Magic and the Occult," *Iran and the Caucasus* 7 (2003): 94.

[10] Asatrian, "Ibn Khaldun," 73–123.

[11] Hermeticism is referred to the writings of the legendary Egyptian-Greek sage, Hermes Trismegistus (Thrice-Great Hermes). For the Arabic reception of Hermes, see Kevin Van Bladel, *The Arabic Hermes: From Pagan Sage to Prophet of Science* (Oxford: Oxford University Press, 2009). Neoplatonism is a term coined by historians to describe the philosophical ideas of Late Antiquity. For an overview of the concept and the translation of Neoplatonic ideas in the Islamic world see Peter Adamson, "Neoplatonism" in *Encyclopaedia of Islam,* Third Edition, accessed September 28, 2021, http://dx.doi.org/10.1163/15733912_ei3_COM_41019.

[12] Liana Saif, "From *Ghāyat al-ḥakīm* to *Shams al-Maʿārif*: Ways of Knowing and Paths of Power in Medieval Islam," *Arabica*, no. 64 (2017): 297.

[13] Liana Saif, *The Arabic Influences on Early Modern Occult Philosophy* (New York: Palgrave Macmillan, 2015), 3–4. For an overall argument on Islamic occult sciences and its relationship to science

framework encases the occult sciences: the paradigm of "creation by emanation," that is, that God created the celestial world first from which the terrestrial world emanates justifies the occult within the remit of a religious worldview (see also Chapter 4 for Neoplatonism).[14] By examining medieval Arabic sources on magic, Liana Saif argues that the occult sciences positioned themselves within the domain of the natural (as opposed to the supernatural).[15] These occult sciences include astral magic, astrology, alchemy, as well as the science of letters and letter magic[16]—all of which were considered white or licit magic in the medieval period. In the twelfth and thirteenth centuries, the various strands of esotericism (*bāṭiniyya*; Sufism being one of them) built themselves on existing intellectual paradigms of the occult sciences that explained the hidden, the extraordinary, and the mysterious.[17] Particularly evident in the intellectual sciences is a gradual move of thinking about the occult from the lens of natural philosophy in tenth and eleventh centuries, to considering the occult within religious and mystical frameworks in the twelfth and thirteenth centuries.[18] In this way, the idea and practices of astral magic become assimilated within the Islamic faith tradition. For

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see Matthew Melvin-Koushki, "Is (Islamic) Occult Science Science?" *Theology and Science* 18: 2 (2020): 303–24.

[14] Adamson, "Neoplatonism."

[15] Saif, "From *Ghāyat al-hakīm*," 297.

[16] Ibn Khaldun describes letter magic (*sīmiyā'*) as part of one of the most passive and natural forms of magic, as the Arabic letters align closely with the elemental world, see Asatrian, "Ibn Khaldun," 101–3. For the nuances between '*ilm al-ḥurūf* and *sīmiyā* see, Saif, "From *Ghāyat al-hakīm,*" 335–7.

[17] Saif, "From *Ghāyat al-hakīm*," 297. For Sufism as one element of Islamic esotericism, see Simon Sorgenfrei, "Hidden or Forbidden, Elected or Rejected: Sufism as 'Islamic Esotericism?" *Islam and Christian-Muslim Relations* 29: 2 (2018): 145–65. For an overview of Islamic esotericism (*bāṭiniyya*), see Liana Saif, "What is Islamic Esotericism," *Correspondences* 7, no. 1 (2019): 1–59.

[18] Saif, "From *Ghāyat al-hakīm*," 297–345.

instance, the notion of *khawāṣṣ* (hidden or occult properties) integral to the plant or gem, becomes embedded within letters of the Arabic alphabet, certain Qur'anic elements, and the ninety-nine names of Allah.[19] And the letters of the Arabic alphabet are classified according to the elemental world (earth, fire, air, water; see also Chapter 2 for the elemental world in scientific manuscripts). This range of intellectual thought, beliefs, and practices demonstrate the overlapping categories of magic, science, and religion in medieval Islam (see also Introduction for magic as intersecting with science and religion).

Taking the various manifestations of the magical — from its healing, prophylactic, and apotropaic, to its natural and cosmological, to its pietistic, mystical, and esoteric dimensions — this chapter charts the role and meanings ascribed to polygonal shapes. The expansive definition of magic proposed for this dissertation allows for the consideration of diverse categories and objects that engage with the hidden world. In addition to the encounters with invisible knowledge and forces, the materials examined in the category of magic also have another common outlook: the idea that everything in the universe is connected to one another, especially the interconnected terrestrial and celestial worlds.[20] The unified Late Antique and medieval universe was discussed in Chapter 2; in this chapter (and Chapter 4 and 5), the cosmos and its forces are harnessed for worldly

[19] Manfred Ullmann, "Khāṣṣa" in *Encyclopaedia of Islam,* Second Edition, accessed September 28, 2021, http://dx.doi.org/10.1163/1573-3912_islam_SIM_4227.

[20] This is one of the characteristics of esotericism as proposed by Antoine Faivre, *Access to Western Esotericism* (Albany: State University of New York Press, 1994), 10–15. While his scholarship is critiqued especially in relation to Islamic thought, his methodology is helpful for identifying characteristics of "magic" that are consistent across the spectrum of diverse objects and cultural traditions considered in this dissertation. For an overview of Faivre's categories and the field of esotericism, including magic, see Glenn Anderson Magee, introduction to *The Cambridge Handbook of Western Mysticism and Esotericism*, ed. Glenn Anderson Magee (Cambridge: Cambridge University Press, 2016), xiii–xxxvi.

gain and knowledge. Considering the transcultural nature of rituals, practices, beliefs systems, and visual vocabulary, particularly in the Late Antique and medieval Mediterranean, the chapters focus on the ways in which the geometric shape (and script) played a role in the magical imagination across cultures (for historical context, methodology, and the rationale for a wide temporal and geographic framework, see Introduction). This chapter classifies the materials using a typological approach consistent with the previous two chapters: quadrilateral enclosures; quadrilateral grids; and polygonal and star shapes. As seen in Chapter 2, the geometric shape constitutes semantic value; it fosters new relationships, creates new knowledge, and establishes an ordered environment. This chapter will demonstrate that the geometric shape was harnessed for magical purposes, particularly as a means of protection and framing of powerful iconography; an adherence to the world of elements or the "logic of the tetrad;" and as a means of identification with the cosmic world—ultimately the geometric shape participated in encounters with (and often, control of) the ordered world system.

3.0 Quadrilateral Diagrams

The first part of this chapter focuses upon quadrilateral compositions—employing geometric lines, script, or a combination of line and script—and the two ways in which the shape commonly appears across materials classified as magical: quadrilaterals as framing devices and quadrilaterals as grid-like formations. In the Introduction, the dissertation also establishes the relationship between script (Arabic and others) and magical efficacy, particularly the archaic, foreign, multidirectional, and illegible scripts and pseudo-scripts. This section will build on both frameworks, centering on the role of

the quadrilateral shape and the role of script as they coalesce within the context of the magical object.

3.1 Quadrilaterals as Frames

In the scientific manuscripts surveyed in the previous chapter, the four vertices of the quadratic figures were central features representing the content; that is, the square served to visualize the four elements and their relationships. An examination of quadrilateral frames in magical materials shows that the content is generally not centered along the vertices in the same manner; neither is there a practical reason for using a quadratic figure, considering that the content or verbal message is not directly amenable to the four-sided shape. When quadratic shapes are used in a magical context, they tend to frame or enclose image/s or script. Examples of the conspicuous use of squares and rectangles in magical objects can be seen as early as the Greco-Egyptian period (c. 500 BC–300 AD). The period is well-known for its syncretic magical tradition that includes materials such as the Greek Magical Papyri (see also Chapter 4), amulets and curse tablets in metal sheets, and magical gems—all of which employ a variety of script and pseudo-script.[21] The charms and incantations on these objects are often seen arranged in rectangular forms, framing text and images. They are particularly pertinent in magical gems[22] and as part of instructional materials in the Greek Magical Papyri (table 2, nos. 1

[21] For an overview of the syncretic Greco-Egyptian magical tradition and its popularity across the Mediterreanean regions in Late Antiquity, see Gideon Bohak, "The Diffusion of the Greco-Egyptian Magical Tradition in Late Antiquity," in *Greco-Egyptian Interactions: Literature, Translation, And Culture, 500 BC–AD 300*, ed. Ian Rutherford (Oxford: Oxford University Press, 2016), 357–82.

[22] See the magical gems in Campbell Bonner, *Studies in Magical Amulets, chiefly Graeco-Egyptian* (Ann Arbor: University of Michigan Press, 1950); for recent scholarship on the topic, see Árpád M. Nagy, "Engineering Ancient Amulets: Magical Gems of the Roman Imperial Period," in *The Materiality of Magic*, ed. Dietrich Boschung and Jan Bremmer (Munich: Wilhelm Fink, 2015), 205–40.

and 2).[23] The visual movement of the incantation script either along the contours of the shape, or mimicking the shape, indicates an intimate relationship between the text and the shape: the word, without the geometric shape, would be unable to perform the magical act. As Raquel Hernández points out, "the magical word and the shape act together."[24] The quadrilateral incantation also physically unites and encloses either text and/or iconography, suggesting a layer of protection for the inner contents. Towards the beginning of the sixth century, similar magical texts employ Christian symbols, such as the cross, to commence and seal the spells, reinforcing the magical significance of framing devices.[25]

Geometric frames as sources of protection and safety also appear on everyday objects, such as textiles from Late Antique (and later) Egypt. Known more commonly as "Coptic textiles," they can be dated between the third and twelfth centuries AD and were used across the eastern Mediterranean region, spanning Byzantine and Islamic rule.[26]

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[23] For an overview of the Greek magical papyri see William Brashear, "The Greek Magical Papyri: An Introduction and Survey; Annotated Bibliography (1928–1994)," in *Aufstieg und Niedergang der römischen Welt*, ed. Hildegard Temporini and Wolfgang Haase II 18.5 (Berlin: De Gruyter, 1995), 3380–3684; for a translation of the magical papyri, see Hans Dieter Betz, *The Greek Magical Papyri in Translation, Including the Demotic Spells*, 2nd ed (Chicago: University of Chicago Press, 1992).

[24] Raquel Martín Hernández, "Reading Magical Drawings in the Greek Magical Papyri," in *Actes Du 26e Congres International de Papyrologie: Genève, 16–21 Août 2010* (Genève: Faculté des Lettres de l'Université de Genève, 2012), 495. See also Attilio Mastrocinque, "Le pouvoir de l'écriture dans la magie," *Cahiers Modes Anciens* 1 (2010), doi.org/10.4000/mondesanciens.168

[25] See for instance the following papyri: P.Oxy XVI 2061–3. They are discussed in Theodore de Bruyn, *Making Amulets Christian: Artefacts, Scribes, and Contexts* (Oxford: Oxford University Press, 2017), 90–1; several other studies deal with the intersection of magic and Christian elements, such as Ildar Garipzanov, *Graphic Signs of Authority in Late Antiquity and the Early Middle Ages, 300-900* (Oxford: Oxford University Press, 2018); and Sulochana Ruth Asirvatham, Corinne Pache, and John Watrous, eds., *Between Magic and Religion: Interdisciplinary Studies in Ancient Mediterranean Religion and Society* (Lanham: Rowman & Littlefield, 2001).

[26] For an overview of the materials, see Annemarie Stauffer et al., *Textiles of Late Antiquity* (New York: Metropolitan Museum of Art, 1996); and Thelma K. Thomas, "Coptic and Byzantine Textiles Found in Egypt: Copora Collections and Scholarly Perspectives," in *Egypt in the Byzantine World, 300-700*, ed. Roger S. Bagnall (Cambridge: Cambridge University Press, 2010), 137–62. For textiles dating to the

Given the widespread nature of magical practices in Late Antiquity, scholars have interpreted the variety of geometric motifs on the textiles as a visual response to the world of spirits that dominated Late Antique society—that is, the geometric shape averts evil and attracts good fortune.[27] The fact that many of the Byzantine textiles were found in cemeteries for wrapping the deceased bodies augments the significance of the supernatural world and the need for protection.[28] Many of the geometric motifs also appear as patches sewn onto the garment, indicating its social value through reuse.[29] The square shape on the textiles generally operate in conjunction with other apotropaic vocabulary, such as images of deities, knotting and interlacing, and repetitive imagery enclosed within the frame (table 2, nos. 3 and 4)—all participating to increase the overall efficacy and amplify the object's magical potency.[30] The Coptic textiles and the Greco-Egyptian magical objects were widespread in Late Antiquity, especially in the eastern

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Islamic rule, see Deborah Thompson, "Miniaturization as a Design Principle in Late Coptic Textiles of the Islamic Period: Observations on the Classification of Coptic Textiles," *Journal of the American Research Center in Egypt* 22 (1985): 55–71.

[27] Eunice Dauterman Maguire, Henry Maguire, and Maggie J. Duncan-Flowers, *Art and Holy Powers in the Early Christian House* (Urbana: University of Illinois Press, 1989), 2. For a discussion of apotropaism and Late Antique clothing, see also Faith Morgan, *Dress and Personal Appearance in Late Antiquity: The Clothing of the Lower and Middle Classes* (Leiden: Brill, 2018), 32–64.

[28] For find settings see Sabine Schrenk, ed., *Textiles in Situ. Their Find Spots in Egypt and Neighbouring Countries in the First Millennium CE* (Riggisberger: Abegg-Stiftung, 2006), 95–112.

[29] Thelma K. Thomas, "Costume, Fashion, and Taste in the Late Antique Egypt: 'Decorative Devices' from the Textile Collection in the Kelsey Museum," *Bulletin of the University of Michigan Museums of Art and Archaeology* 12 (1997): 94.

[30] For a range of apotropaic motifs on textiles, see Henry Maguire, "Garments Pleasing to God: The Significance of Domestic Textile Designs in the Early Byzantine Period," *Dumbarton Oaks Papers* 44 (1990): 215–44; and Morgan, *Dress*, 38–44. For knots as magical, see Maguire, "Garments," 216–7; Ernst Kitzinger, "The Threshold of the Holy Shrine: Observations on Floor Mosaics at Antioch and Bethlehem," in *Studies in Late Antique, Byzantine and Medieval Western Art* (London: Pindar Press, 2002), 244–259; and Allegra Iaftrate, "Much Ado About Knotting," in *The Long Life of Magical Objects: A Study in the Solomonic Tradition* (Pennsylvania: Pennsylvania State University Press, 2019), 80–177.

Mediterranean region.[31] Such cultural interactions within Late Antiquity suggest that in concert with the images, the magical ideas of the geometric shapes were likely not confined along regional boundaries.

Magical documents from the archive of the Cairo Geniza, the treasure trove of fragments from the Ben Ezra synagogue in old Cairo, corroborate the use of rectangular frames as markers of significance.[32] While the Geniza materials are challenging to date precisely, many can be attributed to the medieval period. In these texts, rectangular boxes surround supernatural names (angels, demons, names of God) or magical words, visually demarcating the names and distinguishing them from the remainder of the text (see table 2, nos. 5 and 6; and fig. 3.1). Ortal-Paz Saar explains that along with the use of magical signs, constructing boxes around words was one of the primary visual features of Jewish magical texts, both as part of instructional recipes and in finished objects for use.[33] The examples suggest that the more enclosures employed in a text, the greater the efficacy, at least in visual terms.

The materials thus far have demonstrated that the frame binds, protects, and seals the contents inside the shape. In amuletic objects from the Islamic period, the presence of quadrilateral frames suggests an analogous interpretation. Most interesting among them is a block-printed bilingual amulet from the Austrian National Library (A.Ch 12.145). This

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[31] Bohak, "The Diffusion," 370–8; and Nagy, "Engineering Ancient Amulets," 210.

[32] For an overview of magic in the Geniza documents, see Gideon Bohak, "Towards a Catalogue of the Magical, Astrological, Divinatory and Alchemical Fragments from the Cambridge Genizah Collections," in *"From a Sacred Source": Genizah Studies in Honour of Professor Stefan C. Reif*, ed. Ben Outhwaite and Siam Bhayro (Brill: Leiden, 2011), 53–79.

[33] Ortal-Paz Saar, "Geniza Magical Documents," *Jewish History* (2019): 1–8, doi.org/10.1007/s10835-019-09322-6.

fragmentary amulet presents an Arabic text, with a rectangular frame composed of Greek text running down the page between two vertical lines (only the right side of the frame survives; table 2, no. 7). Thomas Arnold and Adolf Grohmann have illustrated that single and multiple frames were ubiquitous in Christian texts.[34] The employment of a Greek text-frame in a paper fragment with Arabic text demonstrates a continuation of a practice that was familiar to its constituents; a visual pattern that transcends the reading of the script. Several xylographic amulets in Arabic, attributed to the tenth and eleventh centuries, employ quadrilateral script-frames to visually delineate the presence of a magical force.[35] For instance, a tenth-century block-printed amulet at the Austrian National Library (A.Ch 12.140) employs a bold Kufic script in reserve (intaglio) within a rectangular band with the phrase: "might and power belong to Allah" (table 2, no. 8).[36] In another example at the Los Angeles County Museum of Art (M.2002.1.370), a square-framed text band circumscribes a circular figure (fig. 3.2, and table 2, no. 9), in a manner very similar to the final recipes of the *Kitāb al-diryāq*, praising and beseeching Allah.[37] Both the amulets illustrate that the rectangular and square enclosures are playing a role in

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[34] Thomas W. Arnold and Adolf Grohmann, *The Islamic Book: A Contribution to its Art and History from the VII-XVIII Century* (Paris: Pegasus Press, 1929), 29.

[35] The extant amulets are challenging to date and current scholarship places these materials between the ninth and the fourteenth centuries, with no conclusive evidence of their geographic production. Majority of the amulets are from Egypt, but evidence points to at least one from eastern Iran. For an introduction and overview of the block-printed amulets see Karl R. Schaefer, *Enigmatic Charms: Medieval Arabic Block Printed Amulets in American and European Libraries and Museums* (Leiden: Brill, 2006). See also Arianna d'Ottone, "A Far Eastern Type of Print Technique for Islamic Amulets from the Mediterranean: An Unpublished Example," *Scripta: An International Journal of Codicology and Paleography* 6 (2013): 69–70.

[36] Schaefer, *Enigmatic Charms*, 131.

[37] According to the LACMA website, the amulet has been attributed to fourteenth- or fifteenth-century Spain based on an inscription in red ink that precedes the magical design. The inscription reads: "there is no conqueror except God," a motto of the Nasrid dynasty in Spain. "Amulet," Los Angeles County Museum of Art, accessed July 18, 2020, https://collections.lacma.org/node/204553.

the magical process. The fact that both the quadratic frames are also calling on the name of Allah, amplifies the efficacy of the shape—both word and image working in tandem to intensify the potency of the object.

Identical patterns are also found on amulets in different media. They include copious amounts of script as part of a quadrilateral frame, such as on a bronze pendant held at the Los Angeles County Museum of Art (M.2002.1.609a-b), attributed to between the twelfth and fifteenth centuries (table 2, no. 10).[38] Alternatively, on a tenth-century silver amulet case from the David Collection (Inv. no. 8/1987), the textual content is kept to a minimum (fig. 3.3, and table 2, no. 11). In the latter, an abstract Kufic script in niello inlay is arranged into a square, invoking Allah's blessing on a certain Hassan ibn Ahmad.[39] Similarly, a variety of quadrilateral framing patterns can be observed on seals and seal-rings (*khātim*) from the early and medieval Islamic period that often also function in an amuletic capacity (for a discussion of administrative and personal seals, see Chapter 4.1).[40] Like the objects discussed above, the materials under this category are often of unknown provenance and challenging to date and thus have been studied in scholarship either epigraphically or typologically.[41] In these objects, quadrilateral shapes

[38] The Museum website dates it to the fifteenth century. "Amulet," Los Angeles County Museum of Art, accessed July 18, 2020, https://collections.lacma.org/node/204913.

[39] "Amulet case," David Collection, Islamic art: Metal, accessed August 5, 2020, https://www.davidmus.dk/en/collections/islamic/materials/metal/art/8-1987.

[40] For the magical function of seals and seal-rings, see also Venetia Porter, "Islamic Seals: Magical or Practical?" in *Magic and Divination in Early Islam*, ed. Emilie Savage Smith (Aldershot: Ashgate, 2004), 179–200. For more on sealing, see J. Allan and D. Sourdel, "Kh̲ātam, Kh̲ātim", in *Encyclopaedia of Islam,* Second Edition, accessed October 17, 2021, http://dx.doi.org/10.1163/1573-3912_islam_SIM_4232.

[41] See for instance Venetia Porter, *Arabic and Persian Seals and Amulets in the British Museum* (London: British Museum Press, 2011). See also Ludvik Kalus, *Catalog des cachets, bulles et talismans islamique* (Paris: Bibliothèque Nationale, Départment de Monnaies, Médailles et Antiques, 1981). A collection of Islamic rings and seals can be seen in the following catalogues: Derek J. Content and

are employed as solely geometric frames or integrate script as a means of drawing attention to the shape (see table 2, nos. 14–8). The objects, many of which take the form of precious stones mounted on rings, further obfuscate the legibility of the script by using a Linear Kufic style (fig. 3.4). While some of them are personalized, others include more generic protective phrases, such as "God sufficeth me" (Q9: 129; table 2, no. 15) (see also Chapter 5 for the use of this phrase in monumental art), putting them in the same category—textually and visually—as the mass produced block-printed amulets discussed above. The issue of legibility is pertinent when considering the magical materials of the medieval Islamic period. In many of the objects, I have discussed the challenge of reading the inscriptions, particularly as they are either stylized or rendered in the form of the quadrilateral. However, recent scholarship provides evidence of increasing literacy among the common man, such as merchants and craftsmen, where literacy is understood to be in the form of both visual and aural means.[42] Even if one cannot directly comprehend the visual, the aural assists in the comprehension of the text. The aural and visual are thus bound. Efficacy must, therefore, be understood in the combination of word and shape.

The examples in this section illustrate that the quadrilateral shape is a visible feature in materials related to magic. The practice of quadratic framing and enclosures in Late Antiquity such as in magical gems, magical papyri, and Coptic textiles, are also observable in the medieval period in materials from the Jewish, Christian, and Islamic

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Benjamin Zucker, eds., *Islamic Rings and Gems: The Benjamin Zucker Collection* (London: Philip Wilson Publishers, 1987); and Marian Wenzel, *Ornament and Amulet: Rings of the Islamic Lands*. The Nasser D. Khalili Collection of Islamic art (London: The Nour Foundation, 1993).

[42] For reading and writing practices, see also Konrad Hirschler, *The Written Word in the Medieval Arabic Lands. A Social and Cultural History of Reading Practices* (Edinburgh: Edinburgh University Press, 2012), 16–30.

tradition—from Iran to Egypt. In each of the examples, the rectangular or square frame is meaningful when paired with additional magical vocabulary, such as the image of the deity in Coptic textiles, or the name of supernatural entities in the Genizah fragments. The significance of the shape is enforced when paired with text that is arranged around it, text that often takes the form of an incantation, or powerful religious phrases (see Introduction for the relationship between magic and writing). The shape and content operate in concert to magnify magical efficacy. As amulets, many of the objects discussed in this section were worn on or close to the body. This means that the inscription need not always be read for the magical power to be activated; the words, and by extension, the pattern, was continuously working to protecting the client.

3.2 Quadrilaterals as Grids

The second method of harnessing the geometric composition is through the form of a grid. In this form, the quadrilateral shape is internally divided into several units in order to categorize information and highlight the relationships between the different entities. In contrast to the shape as a framing device, as discussed above, information is this configuration is confined inside each geometric shape. Compared to any other shape, a quadrilateral construction generates the maximum surface area, providing the scribe/craftsman with an even, straight plane to experiment with any number of subdivisions. In most cases, the subdivisions are generated through the use of geometric lines, either parallel to the frames or diagonally across the vertices. Text can accompany and emulate the internal geometric planes of the shape, as is the case with horoscopes;

other times, script is placed within the cells created by geometric divisions, most prominent in the formation of magic squares.

3.2.1 Horoscopes

The use of quadratic grid compositions is predominant in the casting of horoscopes. A medium employed for forecasting and predictions, astrology and horoscopes are the most ubiquitous of divination practices in the medieval period.[43] While horoscopes of antiquity are represented in a circular form (see Chapter 4), it is only from the tenth century onwards that a quadratic composition appears, first in late Byzantine codices, and soon after in Arabic and Hebrew iterations.[44] The earliest surviving Greek composition in the square form is from a manuscript attributed to the eleventh century; the horoscope was cast on October 28, 497 AD.[45] In this composition, the quadratic form includes eight internal divisions comprising of straight and diagonal lines, paired with Greek text (table 2, no. 19). Arabic and Hebrew versions, dated to eleventh and twelfth centuries, appear in horoscopes found at the Cairo Geniza (see table 2, no. 20 and 21).[46] The rectangular form and its subdivisions conform to the standard practice found in the Greek horoscope, with the addition of a geometric frame. Johann Thomann reveals that while the standard

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[43] For a discussion on the transmission of astrology from Late Antiquity to the medieval period, see David Pingree, "From Alexandria to Baghdad to Byzantium: The Transmission of Astrology," *International Journal of the Classical Tradition* 8 (2001): 3–37.

[44] Johannes Thomann, "Square Horoscope Diagrams in Middle Eastern Astrology and Chinese Cosmological Diagrams: Were These Designs Transmitted through the Silk Road?," in *The Journey of Maps and Images on the Silk Road*, ed. Philippe Forêt and Andreas Kaplony (Leiden: Brill, 2008), 99–101.

[45] The text is ascribed to Eutokios and attributed to 1000 AD. Florence, Cod. Laur. Plut. 28, 34. Reproduced in Thomann, "Square Horoscope Diagrams," fig. 5.6

[46] Bernard R. Goldstein and David Pingree, "Horoscopes from the Cairo Geniza," *Journal of Near Eastern Studies* 36, no. 2 (1977): 113–44.

division seen in the Greek manuscript is widespread, the medieval horoscopes also employ other diagonal and rhomboidal divisions.[47] The different techniques of dissecting the quadratic form are apparent not only in the Cairo Geniza documents, but also in astrological treatises of Abu Mash'ar al-Balkhi (787–886), Masha'allah ibn Athari (740–815), and Musa ibn Nawbakht (860–940); the latter's manuscript illustrating 48 square diagrams (BnF, Paris arabe 2591).[48] The famed astrologer, Abu Mash'ar, in his *Kitāb taḥāwil sinī al-mawālīd* (*The Revolutions of the Years of Nativities*) posits some instructions for birthday horoscopes:

> If you wish to make a complete picture (*ṣūra*) of the revolution of the year, produce a circular (*mudawwara*) or a square (*murabba'a*) picture (*ṣūra*) and divide it (*qismahā*) into twelve parts, as the use is spread among people.[49]

The instructions make clear that use of a square (or a circle) was imperative for the representation of a horoscope, as was its division into twelve components. An example of this birthday horoscope, the most popular variety, can be seen in a Geniza fragment (fig. 3.5), illustrating the standard method of division which is identical to the Greek horoscope from the eleventh century. The central square identifies an eight-year-old's father as the client, together with the year 1146 for the casting of the horoscope.[50] The twelve individual grid-like divisions encircling the center feature various signs of the zodiac and related planets. A more carefully constructed version, designed with figural illustrations of the zodiac, can be seen from eastern Iran in the same period (table 2, no.

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[47] Thomann, "Square," 106.

[48] Thomann, "Square," 109.

[49] Text from manuscript at BnF, Paris arabe 2588, fol. 35r. Translated in Thomann, "Square," 110.

[50] For a complete transcription and translation of the horoscope, see Goldstein and Pingree, "Horoscopes," 124–7.

22). In all these charts, the text is either enclosed within the grids or conforms closely to the geometric lines of the frame or the subdivisions. Particularly conspicuous are the diagonals that carry text above and below; the interaction of word (text) and image (geometric lines) in this manner suggests that both elements are crucial in the composition and interdependent on one another. The four diagonals and the associated text are also tangibly connected to the central enclosure—the latter, often depicting the name of the client. This visual technique suggests that it was not sufficient that the geometric diagonal connects to the central square, but that the text must also be palpably bonded to the individual for whom the horoscope is intended. If this is the case, then a circular form is also justified, as it would have provided for a more equal distribution of space and information. As seen from Abu Masha'r's treatise, both forms were valid and utilized. Thomann reveals that the appearance of the square Greek version and subsequent Arabic and Hebrew depictions in the square form were a result of the copious travels and exchanges within the Silk Road during the medieval period. As such, Chinese divination and horoscopic images constructed in the square form were adopted in the eastern Mediterranean intellectual milieu.[51] These illustrations suggest that while cultural exchanges and specific rationales govern the visual composition of the horoscope, a degree of experimentation and flexibility allowed for different variations of internal divisions.

3.2.2 Magic Squares

A magic square is a square diagram composed of numerical grids with consecutive natural numbers, where the sum of its horizontal, vertical, and diagonal components is

[51] Thomann, "Square," 114.

equal in value. Like the horoscopes, magic squares originate in China, before making their way to the Islamic world. The square of three, namely the *Lo-Shu*, embodied religious and philosophical beliefs in Ancient China.[52] Schuyler Cammann suggests that, more generally, "the magic square was a miniature diagram of the earth or of the universe"; an idea corroborated in the early Islamic world where the arithmetic perfection of the square has culturally imbued the diagram with earthly and supernatural qualities (see Chapter 2 for square representations of the world).[53] The earliest known treatise to have discussed the magic square in the Islamic sources is a medical compendium, *Firdaws al-ḥikma* (*Paradise of Wisdom*, c. 850), of ʻAli ibn Sahl Rabban al-Tabari (also seen in Chapter 2) — the square of three functioning as a healing device for women, specifically for the ease of childbirth (see below for the ritual associated with the magic square and childbirth). This treatise builds on Syriac translations of Greek sources, Persian translations, and Indian knowledge.[54] In India, magic squares were pervasively used for medical purposes, leading scholars to attribute the genesis of magic squares in Islam as a result of knowledge contacts with India, rather than a direct Chinese pathway.[55] Of particular interest for this study is the work of a sixth-century Indian

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[52] For more on magic square in China, see Schuyler Cammann, "The Magic Square of Three in Old Chinese Philosophy and Religion," *History of Religions* I (1961): 37–80.

[53] Schuyler Cammann, "Islamic and Indian Magic Squares. Part I," *History of Religions* 8, no. 3 (1969): 183.

[54] Manfred Ullmann, *Islamic Medicine* (Edinburgh: Edinburgh University Press, 1978), 41. For a complete discussion of the magic squares and its sources see also Bink Hallum, "New Light on Early Arabic Awfāq Literature," in *Islamicate Occult Sciences in Theory and Practice*, ed. Liana Saif, Francesca Leoni, Matthew Melvin-Koushki, and Farouk Yahya (Leiden: Brill, 2021), 57–161.

[55] Cammann, "Islamic and Indian," 191; and Cristian Tolsa, "The Earliest Arabic Magic Squares," *Suhayl International Journal for the History of the Exact and Natural Sciences in Islamic Civilisation* 18 (2020): 19.

scholar, Varahamihira, a leading authority on astronomy, astrology, and divination. His treatise, *Bṛhatsaṃhitā* (c. 550), takes a 4x4 square (grid of sixteen cells) as a basis for determining the quantities for the ingredients of a perfume — this is the earliest known application of the magic square in India.[56] Such a representation, at least in concept, is strikingly similar to the illustrations of the recipes in the *Kitāb al-diryāq*. Cristian Tolsa notes that "modified magic squares" were adapted to cultural needs, including some that were used in India as *yantra*s (meditation images).[57] Described in the same Indian treatise as above, the magic square was also used to determine the most favourable set of proportions for constructing temples.[58]

Other early discussions of magic squares (c. tenth century) in Islamic sources appear in: Jabir ibn Hayyan's (d. c. 815) *Kitāb al-Mawāzīn (Book of Balances)*, an alchemical treatise; the magical handbook of *Ghāyat al-ḥakīm* (*The Goal of the Wise*) by Maslama al-Qurtubi (d. 964); and in the *Rasā'il Ikhwān al-ṣafā' (Epistles of the Brethren of Purity)* of anonymous authorship— all of which further iterate the function of the magic square as assisting women during painful labour.[59] None of these early uses deliberate on the mathematical or the recreational functionality of magic squares; rather, the use of harmonious proportions within the square enclosure serves to embody the sacred and the mysterious; one with functions of healing and practical magic. An excerpt

[56] The author of the Indian treatise is Varahamihira. Takao Hayashi, "Varāhamihira's pandiagonal square of the order four," *Historia Mathematica1* 4 (1987): 159–166; and Takao Hayashi, "Magic squares in Indian mathematics" in *Encyclopaedia of the History of Science, Technology, and Medicine in Non-Western Cultures*, ed. Helaine Selin (Berlin: Springer-Verlag, 2008), 1252–9.

[57] Tolsa, "The Earliest," 3.

[58] Tolsa, "The Earliest," 3.

[59] Hallum, "New Light," 57–161.

from the *Rasā'il* illustrates the inner workings of the magic square, the first time the magic square is connected to astrological conditions:

> that when these concordant things are joined together in a harmonious relationship, they combine, doubling their potency; their effects become manifest, they overcome their opposites, and subdue what is contrary to them … An example of this is the [magic] nine-slot square (*al-shakl al-mutassa'*) which eases childbirth when the nine numbers are entered in the ninth month of pregnancy at the ninth hour of labour.[60]

The authors explicate the practical applications for harnessing the power of such harmonious relationships: the first concerns the realm of medicine, where compound drugs, antidotes, electuaries,[61] and the theriac (*al-tiryāqāt*)[62] are effective primarily due to the exact proportioning of its ingredients; the second is for the construction of talismans that coalesce natural properties and its planetary correspondences. Through such examples, the authors present an ontological framework that explains the concept of harmonious relationships—the whole is greater than the sum of its parts—and its manifestations in medicine and magic.

It is worthwhile to return briefly to al-Tabari's discussion of the magic square. While the *Rasā'il* provides a rationale that informs the functionality of the device, al-Tabari mentions the associated ritual for the application:

> For difficulties in childbirth, my father used to prescribe something wondrous and tested, namely, that you take two pieces of pottery from a new eartherware jug or jar never touched by water and on each you draw (*taṣawwur 'alayhā*) a figure (*shakl*) like this, in which you write a sum such that, however you add it up

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[60] Ikhwan al-Safa, *On Music: An Arabic Critical Edition and English Translation of Epistle 5,* ed. and trans. Owen Wright (Oxford: Oxford University Press in association with the Institute of Ismaili Studies, 2011), 159.

[61] Ikhwan al-Safa, *On Music*, 159. Translator identifies that "*ma'ājiīn*" was used in two iterations of this treatise.

[62] While the English translation uses the word "antidotes," the original Arabic word is "*al-tiryāqāt*." Ikhwan al-Safa, *On Music*, 161.

> vertically, horizontally, or from corner to corner, you get fifteen. Around *(ḥawlahā*) each one you write two verses from the Psalms [of David], and they are brought to the woman so that she gazes intently at the writing on them. Then you place them under her feet.[63]

Several notable insights can be gleaned from this passage. First, healing occurs when the woman intently looks at the figure, activating the efficacious properties of the magic square. The gaze is a significant component of the curative process. Indian physicians, such as Vṛnda (c. 800–950) and Suśruta (c. 800 BC) have also stressed the contemplative nature of the image and its activation through the gaze, which is perhaps the likely derivation of al-Tabari's square ritual.[64] Secondly, as a preface to the quoted passage, the author introduces the magic square and the ritual as something wondrous or magical (*shay' 'ajīb*). Thus, from its inception in the Arabic sources, the square itself involved a component of the wondrous and the unknown. Third, the word used by al-Tabari for magic square is *shakl*. In the passage quoted from the *Rasā'il*, the authors use an identical word, *shakl*, when referring to the magic square. While *shakl* is generally translated as a "geometric form" in contemporary scholarship, its recurrent use to describe a magic square in early (and as will be discussed, also later) sources, may warrant a rethinking of its contextual meaning in medico-magical parlance. Both *shakl* and *'ajīb* have been used in the diagrams of the *Kitāb al-diryāq*, leading one to further reconsider the contextual role of the quadratic shaped grid-like diagrams within the treatise (see Chapter 6 for a complete discussion of these terminologies). Lastly, al-Tabari prescribes that verses from the Psalms surround the figure. This visual dimension of script enclosing (or forming) a

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[63] 'Ali b. Rabban al-Tabari, *Firdaws al-ḥikma fī l-ṭibb (Paradise of Wisdom)*, ed. M. Z. Siddiqi (Berlin-Charlottenburg, 1928), 280–1, quoted in Hallum, "New Light," 73–5.

[64] Tolsa, "The Earliest Arabic Magic Squares," 5. See also Hallum, "New Light," 68–9.

quadratic shape has been discussed in significant detail in the previous section, and the author's specific mention here seeks to corroborate the quadratic framing device as a key component of the magical repertoire.

Several examples from magical manuscripts and portable objects illustrate the magic square (and versions of it) in action. The square of the third order (3x3 square with nine cells), mentioned by both al-Tabari and the authors of the *Rasā'il*, appears in magic-medicinal bowls of the twelfth century. Similar to the healing function of easing the pain related to childbirth, an inscription on a bowl dating to about the twelfth century reads: "this holy (*al-mubāraka*) bowl is useful (*tanfa'*) for the sting of a scorpion and of a snake and the bite of a mad dog, for difficulty in childbirth, nosebleed, stomachache and colic."[65] This inscription is accompanied by two magic squares of the third order, images of a scorpion, snake, mad dog, and a pair of intertwined dragons. In addition, Linear Kufic script, script in a spiral form, unintelligible and isolated Arabic letters, and the presentation of seven symbols[66] make this bowl a quintessential object of magical forms. The inscription also narrates a healing ritual that involves the afflicted individual (or someone on their behalf) drinking water, charged with the engravings of the bowl.[67] Water becomes the medium that absorbs the curative properties of the images and the text, which is then imbibed by the individual. Indian healing manuals of the tenth century

[65] Inscription from a bowl at the Royal Ontario Museum, no. L 976.34. Translation taken from: Annette Ittig, "A Talismanic Bowl," *Annales Islamologiques*, no. 18 (1982): 81.

[66] The seven symbols on the bowl are: a five-pointed star; three perpendicular strokes; the letter *mīm*; a latter with three cross bars; four perpendicular strokes; a second five-pointed star; and the letter *wāw* upside down with its tail forming a horizontal line above all seven elements. The set of seven symbols are known to represent "the Greatest Name of God," which is made known only to a select few. Ittig, "A Talismanic Bowl," 85.

[67] Ittig, "A Talismanic Bowl," 82.

also emphasize the consumption of charged water. In this case, the water is charged through the recitation of an incantation, and must be imbibed in conjunction with gazing at the magic square.[68] The use of magic bowls for healing and protecting oneself from evil spirits can also be traced to Late Antique ceramic bowls with Aramaic and Mandaic script inscribed in spirals, together with figural images (see Chapter 4).[69] The twelfth-century magic bowl exhibits a continued affiliation with prior conceptions of healing rituals and practices, assimilating the magic square within the magical tradition. The inclusion of the magic square on the metal bowl suggests its acceptance as an image embedded with healing power, an image on par with that of the Arabic script and the efficacious properties of venomous creatures.[70] Two additional elements of this magic bowl have a tangential relationship with the *Kitāb al-diryāq* case study: first, the use of the words *mubārak* (holy/auspicious) and *tanfa'* (usefulness) in the inscription of the bowl mirror its usage in the manuscript, suggesting perhaps a more practical or ritualistic function of the images (like that of the bowl) in the treatise. Second is the third-order magic square on the bowl, generally known as *budūḥ*. In the *abjad* system, the Arabic letters have a numerical equivalent and the term *budūḥ* is composed using the four letters (*bā'*, *dāl*, *wāw*, *ḥā'*), equivalents of the four numerical vertices of the square.[71] The sum

[68] Tolsa, "The Earliest Arabic Magic Squares," 5.

[69] See J. B. Segal and Erica C. D. Hunter, *Catalogue of the Aramaic and Mandaic Incantation Bowls in the British Museum* (London: British Museum, 2000).

[70] For Arabic script, see Porter, "The Use of the Arabic Script in Magic." For talismanic properties of serpents and lions, see Persis Berlekamp, "Symmetry, Sympathy, and Sensation: Talismanic Efficacy and Slippery Iconographies in Early Thirteenth-Century Iraq, Syria, and Anatolia," *Representations* 133 (2016): 59–109.

[71] D.B. Macdonald, "Budūḥ" in *Encyclopaedia of Islam,* Second Edition, accessed October 4, 2021, http://dx.doi.org/10.1163/1573-3912_islam_COM_1395.

total of this square (45) also equals the numerical equivalent of the symbol used for the planet, Saturn, namely *zuḥal*.[72] In her analysis of the bowl, Annette Ittig suggests that the *budūḥ* square in particular was used as a visual "shorthand" for its magico-medicinal value.[73] If that is the case, then this provides conclusive evidence to rethink the use of squares in the *Kitāb al-diryāq*, particularly their relationship with astrology as prefaced in the frontispiece of the treatise. Both these points will be discussed in depth in Chapter 6.

In addition to the third-order square, magic squares with numerous combinations abound in amulets of various media. They appear in bronze pendants and rock crystal, and on paper and papyrus (see table 2). In addition to numbers and alphabets (in the *abjad* system), the square grids also employ pious and protective words and phrases. They include the "most beautiful names of God" (see Glossary), as well as Latin squares and verse squares that populate the grids with text from the Qur'an. In Latin squares, identical content is repeated in each row. In verse squares, each successive row drops the first word on the right and adds an additional word on the left, generally incorporating a Qur'anic chapter or verse. The latter is particularly prevalent in magic mirrors of the twelfth century, where the diagonal inscriptions in the cell exhibit a pattern of repetitive words (table 2, no. 26).[74] Many of these amulets exhibit several discrepancies within the content of the square, from missing letters to incorrect numerical integers, particularly if

[72] Ittig, "A Talismanic Bowl," 90.

[73] Ittig, "A Talismanic Bowl," 90.

[74] For more on mirrors and magic, see Anne Regourd, "The Magic Mirror in the Louvre and Additional Observations on the Use of Magic Mirrors in Contemporary Yemen," in *Word of God, Art of Man: the Qur'an and its Creative Expressions*, ed. Fahmida Suleman (Oxford: Oxford University Press in association with the Institute of Ismaili Studies, 2007), 135–55.

one tries to reconstruct a mathematically sound magic square.[75] Amulets of this type were attractive for the common man for their appearance, considering partial literacy among the population at this time (see also section 3.1 above for legibility).[76] Hence, the image takes precedence, with both the makers and the clientele identifying and associating magical powers with the design and layout of the amulets.

While magic squares emerge in the context of healing and magic, it is from the tenth century onwards that solely mathematical treatises of magic squares (*wafq al-a'dād* [*Harmonic disposition of numbers*]) are produced — 'Ali ibn Ahmad al-Antaki (d. 987) and Abu'l Wafa' al-Buzjani (940–997/8) are two of the earliest authors.[77] Work by scholars such as Abu Ishaq al-Zarqali (d. 1100) and Abu Hamid al-Ghazali (d. 1111) attest to the fact that even in the eleventh and twelfth centuries, the astrological significance and the magical properties (*khawāṣṣ*) of the magic square continued to proliferate despite the advances in mathematical discourse.[78] The prevalence of magic squares in magical objects as discussed in this section, further corroborates the very practical nature of protection and apotropaia attributed to the device, perhaps enhanced by the rigorous analyses witnessed in the mathematical works. The use of magic squares in relation to occult and mystical practice crystallizes with the popularity of Shihab al-

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[75]See the discussion in Mark Muehlhaeusler, "Math and Magic: A Block-Printed *Wafq* Amulet from the Beinecke Library at Yale," *Journal of the American Oriental Society* 130, no. 4 (2010): 612–3.

[76] Muehlhaeusler, "Math and Magic," 617.

[77] Jacques Sesiano, *Magic Squares in the Tenth Century: Two Arabic Treatises by Antaki and Buzjani* (New York: Springer, 2017), 8–9.

[78] For al-Zarqali, see Rosa Comes, "The Transmission of Azarquiel's Magic Squares in Latin Europe," in *Medieval Textual Cultures: Agents of Transmission, Translation, Transformation*, ed. Faith Wallis and Robert Wisnovsky (Berlin: De Gruyter, 2016): 159–98; for al-Ghazali, see Constant Hamès, "Entre recette magique d'Al-Buni et prière islamique d'al-Ghazali: textes talismaniques d'Afrique occidentale," *Systèmes de pensée en Afrique noire* 12 (1993): 191–3.

Din Ahmad b. ʿAli b. Yusuf al-Buni (d. c. 1225 or 1232–1233). The fame of al-Buni is further attested to by the many treatises that have been falsely attributed to him; the manuscripts collectively known as "The Corpus Bunianum."[79] The best-known of these works is the *Shams al-ma'ārif wa-laṭā'if al-'awārif* (*The Sun of Knowledge and the Secret of Gnosis*), the earliest of them dated between the thirteenth and the fourteenth century.[80] The work seamlessly integrates occult practices, religious piety, and mystical discourse, by highlighting the significance of individual Arabic letters (*ḥurūf*), with their concomitant cosmological and metaphysical properties. There are also instructions (albeit ambiguous) on the construction of magic squares.[81] The magic square composed with letter equivalents, rather than numbers, serves to augment the magical qualities of the square, particularly when used for prophylactic purposes. Noah Gardiner describes the magic squares in this treatise as "cryptograms" because "these grids have no obvious mathematical properties,"[82] aptly distinguishing them from the magic squares employed in mathematical works. Another Bunian treatise that discusses magic squares, specifically their use as talismans is the *Laṭā'if al-ishārāt* (*The Subtleties of Signs*) dated to the thirteenth century.[83] In this treatise, the author explicates on the "visionary praxis" of the

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[79] Jan Just Witkam, "Gazing at the Sun: Remarks on the Egyptian Magician al-Buni and his Work," in *O ye Gentlemen: Arabic Studies on Science and Literary Culture*, ed. Arnoud Vrolijk and Jan P. Hogendijk (Leiden: Brill, 2007), 183-199.

[80] The treatise is at the BnF, Paris Arabe 2647. While most scholarship questions the authorship of al-Buni due to anachronisms in content, Liana Saif has claimed this work to be a false attribution to the author. See Saif, "From *Ghāyat al-hakīm* to *Shams al-maʿārif*," 337.

[81] Noah Gardiner, "Forbidden Knowledge? Notes on the Production, Transmission, and Reception of the Major Works of Ahmad al-Buni," *Journal of Arabic and Islamic Studies* 12 (2012): 104.

[82] Gardiner, "Forbidden Knowledge?" fn. 70.

[83] Gardiner, "Forbidden Knowledge?" 105. A fifteenth-century version is also available: BnF Paris arabe 2658

talismans (some of which include the magic squares), discussing the ritual of contemplating the image as a component of partaking in the magical and mystical powers.[84] This interaction of the magic square and the practice of gazing at it is strongly reminiscent of the Indian healing manuals and in al-Tabari's treatise of the ninth century. Even though no written primary source between the tenth and the thirteenth centuries explicitly narrates the ritual of gazing in this way as a source of healing, the evidence in this section implies that the magic square — not necessarily mathematically sound — was activated through the intent gaze of the individual. In *Al-Lum'a al-nūrāniyya fī awrād al-rabbāniyya*, the magic square is closely associated with the Greatest name of God (*al-ism al-'aẓam*). The Bunian corpus makes extensive use of *al-asmā' al-ḥusnā* (the most beautiful names of God). The hundredth and greatest name of God, the *al-ism al-'aẓam*, is kept secret and confined to a select few; in the last treatise, the magic square conceals *al-ism al-'aẓam*, and the ambiguous combination of words, letters, and numbers symbolize the embedded secrets of the world.[85] Ibn Khaldun (d. 1405) summarizes the mechanics of al-Buni's oeuvre: "One should not think that one can get at the secret of the letters with the help of logical reasoning. One gets to it with the help of vision and divine aid."[86] In this way, al-Buni and his corpus create an epistemological framework that distinguishes itself from the rational sciences yet building upon a tradition of Neoplatonic emanationism (discussed above), as argued by Liana Saif.[87]

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[84] Gardiner, "Forbidden Knowledge?" 105.

[85] Gardiner, "Forbidden Knowledge?" 107.

[86] Ibn Khaldun, *The Muqaddima: An Introduction to History*, trans. Franz Rosenthal, vol. 3 (New York: Pantheon Books, 1958), 174.

[87] Saif, "From *Ghāyat al-hakīm* to *Shams al-maʿārif*," 344.

A survey of the four volumes of the *Shams al-ma'ārif al-kubrā* (*The Sun of Knowledge, larger version*)[88] by Tewfiq Canaan reveals the presence of 347 seals, of which 248 are in the form of a square. Amongst these, the 4x4 square features 160 times, and the 3x3 features nineteen times. The largest square grid is 25x25.[89] In his discussion, Canaan outlines the nomenclature incorporated in the treatise to refer to the visual grids, which includes: *khātim*, *wafq*, and *jadwal*. An example of a *khātim* (in the form of a square grid) can be seen in one of the earliest available copy of the *Shams al-ma'ārif* (table 2, no. 27), illustrating seven square seals (*khātim*), one for each day of the week. A talismanic chart dated to nineteenth-century Iran (table 2, no. 29) illustrates the square seals in action. Each of the different square diagrams in this chart is prefaced with a title asking the individual to look at the diagrams in order to assuage or eliminate unwanted conditions. For instance, a title preceding one 5x5 square reads: "Whoever looks at this diagram (*shakl*) will not become ill during this month."[90] Albeit much later than the period under consideration, the chart suggests the survival of a long-standing tradition, where the image of square grid and its activation through the gaze provides an avenue for healing and protection.

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[88] This larger version, compiled in the seventeenth century, has been widely popular since then.

[89] Tewfiq Canaan, "The Decipherment of Arabic Talismans," in *Magic and Divination in Early Islam,* ed. Emilie Savage-Smith (Aldershot: Ashgate, 2004), 164.

[90] Translation taken from: Emilie Savage-Smith, "Magic and Islam," in *Science, Tools & Magic*, vol. 1, Francis Maddison et al. (London: The Nour Foundation in association with Azimuth Editions and Oxford University Press, 1997), 60.

3.2.3 Magical Diagrams

In addition to horoscopes and magic squares, magical treatises also incorporated complex diagrams, presenting information in a variety of different arrangements—all within the confines of a quadratic form. The diagrams comprise simple arrangements where the square figure is divided into four components using two diagonal lines; the more composite diagrams combine elements of diagonal subdivisions and grid-like schema, adding geometric shapes as a means of creating further divisions. In these diagrams, script plays a major role through mimicking the geometric lines, being framed by them, or independently employed to create internal divisions. For instance, a series of fragments from the Cairo Geniza illustrates the magical power of individual letters of the Arabic alphabet, each of which is accompanied by a quadratic diagram (table 2, nos. 30, 31, 35, 36).[91] They include simple subdivisions, such as that of the letter '*lām*' which can be employed for seeking courage against one's enemies. More intricate subdivisions involve letters distributed unevenly across the figure, such the diagram for the letter '*kāf.*' By engraving and steaming this diagram on an old ceramic shard, an individual could tap into the hidden power of this letter to transform the nature of plants.[92] Some of these occult powers of the letters were injurious in nature; others called on the recitation of the *al-ism al-'aẓam* (the greatest name) suggesting that these fragments either belonged to esoteric and Sufi circles, or that Sufi knowledge was common among the period of circulation. The fragments also highlight the seamless intersection of practical magic and mystical knowledge, a trait seen within the Bunian corpus as well. In an attempt to alter

[91] R. Y. Ebied and M. J. L. Young, "A Fragment of a Magic Alphabet from the Cairo Genizah," *Sudhoffs Archiv* 58, no. 4 (1974): 404–8.

[92] Ebied and Young, "A Fragment," 405–6.

the course of events, a combination of letter, diagram, ritual mechanisms, and religious invocations coalesce in these fragments.

Several images from the Bunian corpus (dated 1500–1700) also demonstrate an assortment of structural arrangements. As we begin to examine these images closely, a series of patterns emerge. The first is the subdivision of a square using two diagonals — interestingly this was also a mechanism for visualizing information in scientific tracts (see Chapter 2). In al-Buni's treatises, these diagrams are identified as a *khātim* (square; seal) or even a *tilsam* (talisman) (see table 2, nos. 32–4). The subdivisions created through the diagonals mirror two of the magical diagrams of letters *nūn* and *fā'*, from the Geniza treatise discussed above (table 2, nos. 35–6; see also the visual resonances with the quadratic diagrams of the *Kitāb al-diryāq* in Chapter 1). In both these diagrams, the individual letter is repeated, generally based on its numerical equivalent in the *abjad* system. The associated ritual for *fā'* even mentions the power of the diagram to abate thirst, its inscription on a vessel, and the consumption of the charged water by the ailing individual.[93] This process involving a square diagram, water, and drinking from a vessel, closely aligns with the magic-medicinal bowls of the twelfth century as well as rituals of the magic square discussed by al-Tabari above. Although the images from the Bunian corpus are dated much later than the period under consideration, the images and their magical context demonstrate that square or rectangular forms, diagonal intersections, and individual letters continue to be an important part of the magical vocabulary.

The visual arrangement — a rectangular figure with diagonal intersections and the Arabic script — is rare in extant material culture, but a version of it appears on an

[93] Ebied and Young, "A Fragment," 408.

undated circular metal seal at the British Museum (1887,0115.1), found in India (table 2, no. 37). The diagram is not part of the original conception of the object; rather it was engraved at a later date on its reverse side and likely for the purposes of increasing its magical properties, apparent from the magical writing that appears on the front of the seal. The text presented is perhaps deliberately ambiguous, but the diagram engraved in this manner suggests that the figure itself was meaningful to its users. Another iteration of this figure is found in a Hermetic treatise on letter magic (part of BnF arabe 2357, dated to 1653), entitled *Dā'irat al-aḥruf al-abjadiyya*. Replete with images discussing talismans and fumigation rituals, the manuscript has one image in particular that illustrates the arrangement of alphabets (isolated letterforms) in a quadratic form with geometric diagonals (table 2, no. 38. The outer edges of the figure mark the four elements — water, fire, earth, air—creating a relationship between them and the letters. The treatise discusses the secrets of the twenty-eight letters (*sirr al-ḥurūf*), [94] and the rectangular image is used to visually demarcate the four elements. Notice the parallels between this diagram and the quadrilaterals in scientific treatises (Chapter 2). The square shape, representing the elemental world, is harnessed to both rationalize the magical world of letters within the "logic of the tetrad" and to control the elemental world using the power of letters.

In an attempt to visualize a variety of relationships, the magical treatises also feature quadratic diagrams that incorporate additional geometric figures. The earliest iteration of the *Shams al-ma'ārif* (BnF arabe 2647, dated 1201–1300) for instance,

[94] For a full discussion of this manuscript, see Cécile Bonmariage and Sébastien Moureau, eds., *Le Cercle des lettres de l'alphabet: Dā'irat al-aḥruf al-abjadiyya: un traité pratique de magie des lettres attribué à Hermès* (Leiden: Brill, 2016).

presents a full-page image of a square diagram labelled as a *khātim* (fig. 3.6 and table 2, no. 39). The square features a border with four marked vertices, each of which are further divided into two (see table 1 and Chapter 1 for diagrams of the *Kitāb al-diryāq* that subdivide the cells in similar ways). Within the central circular medallion, the text states the all-encompassing qualities of God. The outer square frame presents the four elements and its properties, as well as the names of God—the scientific, the religious, and the magical colliding within this image. Such images as embodiments of supernatural power continue to proliferate in texts related to magic and healing in the fifteenth and sixteenth centuries (see table 2, no. 40 for an additional example).

This section has examined magical materials in which rectangular and square shapes are divided into grid-like formations. The quadratic grids are prominent in horoscopes, as magic squares, and in magical diagrams. Often, the grids are paired with quadrilateral geometric and text frames, overlapping with the preceding typological category. The common feature that unites the diagrams in this section is the square or rectangular shape that is associated in some way with the celestial world. In the horoscopes, the rectangular frame delineates the night sky that is divided into twelve parts; in the magic square, the image is efficacious because it can harness celestial powers; and in the magical diagrams, powerful names and letters are ordered as in the elemental and celestial world. The content and visual structure of the diagrams highlight that magic and supernatural power were seen as an integrated component of the world, and thus used similar visual mechanisms to illustrate their workings and inner structure.

3.3 Polygons and Stars

In addition to the quadratic shape, polygons and star-shapes of five, six, and eight sides frequently appear in materials related to magical beliefs and practices. In Byzantine and Islamic contexts, the five- and six-pointed star shape closely resonated with magical and mystical knowledge, especially connected to Solomon. King Solomon, the son of the biblical king David, is known in Jewish and Christian traditions as possessing wisdom and esoteric knowledge.[95] *The Testament of Solomon*, a Greek pseudepigraphical text of demonology compiled in the third or fourth century, mentions a ring with an engraved seal that enabled the prophet-king to attain power over all supernatural beings.[96] The pentagram or hexagram is recognized as the image inscribed on Solomon's ring, often referred to as Solomon's seal. The star shape thus features in Late Antique seals and jewelry as a powerful apotropaic symbol.[97] Oftentimes the seal is inscribed along with the word *hygieia* (health), demonstrating the convergence of medicine and magic in the object.[98] The magical tradition of Solomon continues into the Islamic period and the star shape is a formidable feature in Islamic seals, amulets, and rings (see Chapter 4 and table

[95] For more on the Solomonic magical tradition see Pablo A. Torijano, "Solomon and Magic" in *The Figure of Solomon in Jewish, Christian, and Islamic Tradition: King, Sage and Architect*, ed. Joseph Verheyden (Leiden: Brill, 2012), 107–25.

[96] For Solomon's ring in Christian and Islamic literary and material sources, see Allegra Iaftrate, "The Signet Ring," in *The Long Life of Magical Objects: A Study in the Solomonic Tradition* (Pennsylvania: Pennsylvania State University Press, 2019), 41–59. For the *Testament of Solomon*, see Todd Klutz, *Rewriting the Testament of Solomon: Tradition, Conflict and Identity in a Late Antique Pseudepigrapha* (London: T&T Clark, 2005).

[97] See the examples in Gary Vikan, "Art, Medicine, and Magic in Early Byzantium," *Dumbarton Oaks Papers* 38 (1984): 65–86.

[98] Vikan, "Art, Medicine, and Magic," figs. 4 and 8, n.67

3, nos. 14, 19).[99] As its visual form resembles the celestial element (the star), the image is harnessed to reinforce connections with the supernatural and cosmic world. The prevalence of Sufi ideas in the medieval period, particularly the work of al-Buni, further provides a lens for the interpretation of the geometric star pattern (for more on al-Buni, see chapter section above and Chapter 4). In his treatise, the author explicates a series of seven symbols that together constitute the seal of *al-ism al-ʿaẓam*, the "Greatest Name of God." The first of these symbols is a star represented as either a five- or six-pointed star. This seal is not confined to manuscripts of al-Buni but appears in portable objects such as magic bowls and is inscribed in architectural spaces.[100] When combined with script, particularly the repetition of the Prophet's name or those of the Rightly Guided Caliphs, the charged image would likely have the power to negotiate with and counter the supernatural world (see Chapter 5 for this image as part of monumental architecture).

The apotropaic significance of the octagon, the eight-sided geometric shape, is corroborated in the writings of a sixth-century Byzantine physician, Alexander of Tralles: "Take an iron ring and make its hoop eight-sided, and write thus on the octagon: 'Flee, flee O bile, that lark is pursuing you.' Then engrave the following character on the head of the ring: N. I have used this method many times, and I thought it inappropriate not to draw your attention to it, since it has a power against illness."[101] The source underscores

[99] The powers of Solomon (Sulayman) are also mentioned in the Qur'an. See Priscilla Soucek, "Solomon," in *Encyclopaedia of the Qur'an*, ed. Jane Dammen McAuliffe, accessed October 10, 2021, http://dx.doi.org/10.1163/1875-3922_q3_EQCOM_00188.

[100] For bowls, see Ittig, "A Talismanic Bowl," 79–94; and Rachel Hasson, "An Enamelled Glass Bowl with Solomon's Seal: The Meaning of a Pattern," in *Gilded and Enamelled Glass from the Middle East*, ed. Rachel Ward (London: British Museum, 1997), 41–43. For al-Buni's seal on architecture, see Ingrid Hehmeyer, "Water and Sign Magic in Al-Jabin, Yemen," *The American Journal of Islamic Social Sciences* 25:3 (2008): 82–96.

[101] Alexander of Tralles 8.2 (on colic), translated in Vikan, "Art, Medicine, and Magic," 76, n. 69.

the idea that the eight-sided motif played an important role in magical healing. Alexander of Tralles's remark further highlights another efficacious visual: the written word. For the purposes of healing, the polygonal shape operated in concert with the inscription. This outlook is reflected in the Byzantine wedding rings shaped as octagonal hoops, combining script and Christian imagery to protect and safeguard the couple. Alicia Walker has interpreted the geometric shape as one discreetly embedding apotropaic ideas within a visibly Christian milieu.[102] The precious gold material and rich iconographic elements of such rings suggests that apotropaic elements played an important role in the lives of wealthy Christian families. In addition to the magical associations of the shape, the number eight was also symbolic of the rebirth of Jesus. Numerous baptisteries and baptismal fonts were designed in an octagonal shape, particularly from the fifth century to the medieval period, to symbolically assert the reference of rebirth.[103] Late antique philosophers, such as Macrobius (d. 430), explicate the geometrical perfection of the octagon as well as its cosmic associations.[104] Coptic textiles, discussed above in relation to square frames, also employ two intersecting squares to form eight-sided figures.[105] The geometric ornamental motifs were often recycled and reused, appearing as patches on elbow and knee joints, areas prone to pain and injury. The close association between the octagon and supernatural healing offers a platform to rethink the octagon images

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[102] Alicia Walker, "A Reconsideration of Early Byzantine Magic Rings," in *Between Magic and Religion: Interdisciplinary Studies in Ancient Mediterranean Religion and Society*, ed. Sulochana Ruth Asirvatham, Corinne Pache, and John Watrous (Lanham and Oxford: Rowman & Littlefield, 2001), 164.

[103] Robin Jensen, *Living Water: Images, Symbols, and Settings of Early Christian Baptism* (Leiden: Brill, 2010), 244–5.

[104] Jensen, *Living Water*, 245–6.

[105] James Trilling, *The Language of Ornament* (London: Thames & Hudson, 2001), 139. See also MMA 89.18.95.

employed in the diagrams of the *Kitāb al-diryāq* (see Chapter 6 for further analysis). The eight-pointed polygon also appears in monumental spaces such as church pavements and in early Islamic architecture, embedding apotropaic messages (see Chapter 5.4 for examples). While the polygons and star-shaped motifs are multivalent in nature, the wider apotropaic context suggests that these geometric shapes would have been understood in a magical context on numerous occasions.

Conclusion

This chapter adopts an expansive definition in approaching the idea of magic—one that includes material culture and intellectual thought. As such, the discussion includes materials related to healing, apotropaia, astral magic, divination, and esoteric practices. The quadratic composition is a visual device that is consistently employed in magical contexts and can take many forms. Most common is the quadrilateral shape as a framing tool, either in tandem with or independent of script. The enclosure visually unites the component elements within the frame, presenting a single, holistic image. In doing so, the frame also creates a tangible boundary that visually distinguishes the world inside the frame from the world outside—the supernatural and the natural. The frame can be interpreted as a liminal space, and the addition of script (intelligible and meaningless) reinforces that liminality. Examples of quadratic frames as protective and apotropaic symbols can be seen in Graeco-Roman magical gems and Greek Magical Papyri, to Coptic textiles and Islamic block-printed amulets from Egypt, where rectangular borders using script become paradigmatic of a magical visual vocabulary. Both shape and word operate in tandem to create meaning.

Squares divided into smaller cells or grids are another example of a quadratic composition that appears in magical settings, the shape itself representative of the terrestrial or celestial world. The square or rectangular horoscope employs a number of diagonal divisions within the shape, a practice common in Greek, Arabic, Hebrew, and Latin iterations. Magic squares employ a similar grid-like division. Initially known for alleviating pain during childbirth, the magic square becomes pervasive in material culture and esoteric treatises, adapting to include Arabic letters, numbers, and names. The supernatural and magical quality of the square is explained by its ability to harmoniously unite the different components—analogous to the workings and diagrams of the theriac. Lastly, complex magical diagrams involving numerous internal schemata appear in magical and esoteric treaties, all of which employ a quadratic structure. The visual repertoire on magical materials demonstrates that the images do not operate in isolation; rather, the richer the visual repertoire, the more effective is the image. Such workings are also reflective of the idea that the sum of the component parts exceeds the individual benefits of each—an ontological perspective that permeates the magical workings of the theriac and the magic square, as well as the Greco-Egyptian materials.

In addition to the four-sided shape, polygons and star-shaped geometric patterns also feature in magical contexts. Most popular of these is the five- or six-sided star shape that is associated with Solomon's ring, conquering all evil. The shape is also part of the seal explicated by al-Buni, the seal of the "Greatest Name of God." The eight-sided octagon is also closely associated with supernatural healing and protection, appearing in Byzantine marriage rings and Coptic textiles. By taking into account magical practices, ritual, sensory engagement, and intellectual thought, the examples in this chapter

demonstrate that the geometric shape was utilized in these materials precisely because the shape itself was embedded with a magical meaning. The diverse temporal and spatial contexts of the materials highlight the continuity of the magical vocabulary, one that is prevalent even today.

Chapter 4 Protection and Perfection: Circular Arrangements in Magical Materials

The geometric form of the circle is copiously employed in materials relating to magic (for the definition and overview of magic, see Introduction and Chapter 3). Like the square and rectangular shapes, the circular image creates relationships between the textual components it accompanies, whether in the form of physically enclosing the text, creating internal divisions to visualize the various component parts of a concept, or conflating the two. As seen in Chapter 2 and 3, using a geometric form to explicate ideas is a visual trope that extends not only across genres (science/magic in this case) but also spans various media (intermediality). This chapter continues the discussion from the previous chapter regarding the contribution of the geometric shape in the magical process (see Introduction and Chapter 3 for methodology, dating, and object selections)—the focus, however, is on the role of the circle and the meanings ascribed to it. The circular diagrams are classified based on three primary visual methods that appear within the materials. The first is the use of circles as enclosing devices that contain an image or text. This geometric form is seen either independently or paired with an encircling script. The second utilizes a series of concentric circles to indicate relationships and hierarchies between various entities. The final method highlights subdivisions using radial lines or spokes, generally with a marked center as the source or entity that warrants an explication. By extracting the ways in which the circular shape functioned, whether through examining accompanying visual vocabulary, the ritual context, or the magical function of the object or inscription, the discussion will interrogate the choice of the geometric form for visualization. How essential is the medium for the representation of magical knowledge? The chapter (like the previous one) does not assume that the shape

itself is magical; rather, the discussion highlights that the shape played an active role as part of the magical vocabulary and in magical settings. The amplification of the shape will be further examined through the use of script in a circular arrangement, emulating the circumference or the various lines and arcs of the circle (see Introduction for the relationship between script and magical efficacy). Through a series of examples, the chapter demonstrates the role of the circle in the protection of and containment from evil forces, such as demons, jinn, and malicious spirits. The circle is also perceived as the most perfect of the geometric shapes and is therefore employed in cosmological and mystical diagrams to visualize the natural and supernatural world.

4.1 Circular Enclosures: Magical Objects

Circular figures as tools for containment appear in textual sources and material culture in the Late Antique and medieval period. The Greek Magical Papyri (see also Chapter 3 for the Greco-Egyptian magical tradition and the magical papyri) include several spells and diagrams that make exclusive use of a circular ritual or visual form to summon entities. For instance, the sting of a scorpion might be alleviated as follows: "on a clean piece of papyrus, write the characters and place it on the part of which has the sting; wrap / the papyrus around it, and the sting will lose its pain immediately."[1] While it is the efficacy of the characters that heals the wound, the characters must also encircle the sting, allowing them to fully penetrate it from all angles. Another spell incorporates the visual form of the circle, encircling script, as well as oral recitations to accompany the ritual:

[1] PGM VII, 193–96. Hans Dieter Betz, ed., *The Greek Magical Papyri in Translation* (Chicago: University of Chicago Press, 1986), 120.

"keep reciting these words engraved in a circle …"[2] In addition to the use of the circular image and text, sensory elements accompany the act in both cases: in the former, the script physically touches the wound; in the latter, speaking the words aloud is a crucial component in the efficacy of the spell. The diagrams in the papyri further illustrate the significance of the geometric form as part of the magical act (see table 3, nos. 1 and 2; and fig. 4.1), especially as the circular texts incorporates the name/s of the God, spiritual entity, or demon. The papyri instruct the users to invoke "…the great and mighty names of God"[3] and "…to call on the hidden and ineffable name"[4] — elements that immediately resonate with esoteric practices and mystical strands of the Islamic medieval period (see Chapter 3 and below). Like the magical papyri, the magical gems from the eastern Mediterranean employ similar visual mechanisms that incorporate a combination of circular form and script as a means of enclosing, binding, and sealing its contents (see also Chapter 3 for magical gems and their rectangular frames). [5] The gems were particularly popular for healing a variety of bodily ailments, especially with respect to women's health (table 3, nos. 3 and 4).[6]

Incantation bowls from Late Antique and medieval Mesopotamia (under Sassanid empire: 224–651 AD; under Islamic rule from 643 AD) reinforce the link between

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[2] PGM VII, 467–70. Betz, 130.

[3] PGM XII. Betz, 158.

[4] PGM XII. Betz, 162.

[5] See Campbell Bonner, *Studies in Magical Amulets, Chiefly Graeco-Egyptian* (Ann Arbor: University of Michigan Press, 1950).

[6] The largest category of magical gems are uterine gems. See Véronique Dasen and Árpád M. Nagy, "Gems," in *Guide to the Study of Ancient Magic*, ed. David Frankfurter (Leiden: Brill, 2019), 429–431. For a detailed exposition of a uterine gem, see Robert K. Ritner, "A Uterine Amulet in the Oriental Institute Collection," *Journal of Near Eastern Studies* 43, no. 3 (1984): 209–221.

enclosures and circular forms.[7] Attributed between the fifth and the eighth centuries, the unglazed earthenware bowls feature script—largely Aramaic (Hebrew-Aramaic, Mandaic, Syriac), and a smaller subset of Arabic and Pahlavi—pseudo-script, and figural images. For the purposes of repelling demons and evil spirits, these domestic wares were placed upside-down and buried beneath one's home (often in the four corners), also serving as general apotropaia.[8] The wide variety of the visual presentation of scripts (spirals, concentric circles, radial spokes; see also section 4.4 and 4.5) on these bowls provide for a fruitful analysis of the role of script and design in Late Antiquity. A noticeable feature on the bowls is the use of circles to enclose the images of demons (table 3, no. 5).[9] By illustrating the demons as bound entities, the magician is alluding to the capture of demons. This visual presentation of demons finds resonance in the verbal inscriptions of many bowls, featuring words such as "bound" and "sealed" in the invocations.[10] Circumscribing the demons and their movements within this circular frame is analogous to the role that the physical object plays; by placing the bowl upside-down, the bowl itself is designed to entrap the demon within the constraints of the object. An

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[7] For an overview of the incantation bowls, see J. B. Segal and Erica C. Hunter, *Catalogue of the Aramaic and Mandaic Incantation Bowls in the British Museum* (London: British Museum, 2000). For a historical context of the bowls, see Gideon Bohak, *Ancient Jewish Magic: A History* (Cambridge: Cambridge University Press, 2008), and Yuval Harari, *Jewish Magic before the Rise of Kabbalah* (Detroit: Wayne State University Press, 2017). For the relationship of the bowls to the Geniza documents, and the continuity of Jewish magical practices until the twelfth century see Dan Levene and Gideon Bohak, "Divorcing Lilith: From the Babylonian Incantation Bowls to the Cairo Genizah," *Journal of Jewish Studies* 63/2 (2012): 197–217.

[8] Bohak, *Ancient Jewish Magic*, 184–5. See also Joseph Naveh and Shaul Shaked, *Amulets and Magic Bowls: Aramaic Incantations of Late Antiquity* (Jerusalem: Magnes Press, Hebrew University, 1985), 13–9.

[9] See Erica C. D. Hunter, "The Typology of the Incantation Bowls: Physical Features and Decorative Aspects," in *Catalogue of the Aramaic and Mandaic Incantation Bowls in the British Museum*, ed. J. B. Segal (London, 2000), 171.

[10] Segal and Hunter, *Catalogue*, 28.

additional outer circle around the rim further emphasizes this physical entrapment. The frame encircling the demons, in this case, acts as a microcosm to the ritual performance of the bowl.

The internment of demons in this manner finds its roots in the Syrian-Palestinian practices of trapping scorpions and other venomous creatures using household objects.[11] There is a formidable association between scorpions and demons, which allowed the practice of entrapment to expand to the realm of the supernatural (see also Chapter 5 for this discussion in monumental architecture). This visual entrapment on the bowls is augmented by the copious scriptural elements, oral recitations, and performative ritual practices.[12] The magician, in the presence of an audience, would have inscribed the object as part of a ritual ceremony. Part of this performance would have included the magician's construction of the "magic circle"; the circular frames emulating the magical ritual, making it permanent.[13] Erica Hunter notes the presence of some form of the circle on almost all of the bowls in her survey, despite the linguistic affiliation, highlighting the circle as "the cardinal, supra-cultural dimension" of the object.[14] Echoes of the association between venomous creatures, demons, and incantations are pervasive in the Late Antique Near East: "If you see an asp [snake] and want to fix it in its place, say /

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[11] David Frankfurter, "Scorpion/Demon: On the Origin of the Mesopotamian Apotropaic Bowl," *Journal of Near Eastern Studies* 74, no. 1 (2015): 13–17.

[12] Charles G. Häberl, "Aramaic Incantation Texts Between Orality and Textuality," in *Orality and Textuality in the Iranian World: Patterns of Interaction across the Centuries*, ed. Julia Rubanovich (Leiden: Brill, 2015), 365.

[13] Häberl, "Aramaic Incantation," 396.

[14] Hunter, "The Typology," 179.

"Stay!" while turning yourself around. When the names are said, it will stay."[15] So is the ritual of "turning yourself around" or the circular movement of the body. The ephemeral nature of this orality and performativity is etched through the use of circular frames within the bowl, as well as through the act of placing the circular bowl upside-down as a means of entrapment, and hence protection.

Demon traps are equally prevalent in Late Antique textiles that adorn the body and the home (see also Chapter 3). Many of these motifs employ a circular enclosure (*orbiculus*) to contain a variety of patterns—knots and interlaces, Christian narrative imagery—that transfix the demon and protect its wearer from harm (table 3, nos. 6 and 7).[16] The use of circular motifs in the textiles closely emulates jewelry, particularly designs used for apotropaic purposes (table 3, nos. 8 and 9). In Late Antique and medieval Byzantium, items of jewelry such as necklaces, pectorals, rings, and even helmets were replete with coins and pseudo-coins, employing the image of the emperor in an amuletic capacity (see Chapter 5 for a discussion of coins as apotropaia).[17] Even as late as the thirteenth century, incorporating coins and imitation coins in jewelry — even with just a symbolic portrait — fulfilled the role of protection from evil. Coptic textiles of the Byzantine period might also have coins sewn onto the textile fabric to avail of the

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[15] PGM XIII, 250–1. Betz, 179.

[16] The knotted motifs (Greek: katatedo) signify the act of binding. For more on demon trapping and textiles, see Faith Morgan, *Dress and Personal Appearance in Late Antiquity: The Clothing of the Lower and Middle Classes* (Leiden: Brill, 2018), 39–41. For knotting and interlace as demon entrapment see also Alfred Gell, *Art and Agency: An Anthropological Theory* (Oxford: Clarendon Press, 1998), 77–86. For knots and Christian imagery as magical, see Chapter 3, n. 29.

[17] See Henry Maguire, "Magic and Money in the Early Middle Ages," *Speculum* 72, no. 4 (1997): 1037–1054; for pierced coins and their amuletic function see Cécile Morrison and Simon Bendall, "Byzantine 'Medals': Coins, Amulets and Piety," in *Byzantine Religious Culture: Studies in Honor of Alice-Mary Talbot*, ed. Denis Sullivan, Elizabeth Fisher, and Stratis Papaioanou (Leiden: Brill, 2011), 217–38.

apotropaic benefits these objects provided.[18] Even though numismatic jewelry disappears by the thirteenth century, the practice of coins as apotropaia continues throughout the medieval period.[19] In addition to the images of the emperor, the coins or coin-like objects also included the figure of Christ, the Virgin, or a saint, and were similarly worn for their protective powers. The textiles and the coins illustrate the blurring boundaries between magic and religion. [20]

The circular pattern as an embodiment of magical meanings can be corroborated by non-numismatic amulets from Byzantium (Late Antique and medieval). This group of amulets are noteworthy for their use of circular frames with encircling inscriptions (table 3, nos. 10–13). The geometric shape, the text, the image, and the material collide within these objects, traversing the realm of magic and medicine. For instance, the pilgrimage tokens (*eulogiae*) of Symeon Stylite the Younger (521–562), made from the holy dust of the saint's site, are known for their miraculous healing powers.[21] The prophylactic image of the saint is reinforced by encircling inscriptions with his name (fig. 4.2). The materiality of the token was equally significant; touching and even ingesting the holy

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[18] See Jutta-Annette Bruhn, *Coins and Costume in Late Antiquity* (Washington, D.C.: Dumbarton Oaks Research Library and Collection, 1993), 33–4.

[19] Maguire, "Magic and Money," 1044.

[20] For the transition of magical ideas into Christianity see also Alicia Walker, "Myth and Magic in Early Byzantine Jewellery: The Persistence of Pre-Christian Traditions," in *The Material Culture of Sex, Procreation, and Marriage in Premodern Europe*, ed. by Karen Rosoff Encarnación and Anne L. McClanan (New York: Palgrave, 2001), 59–78. See Chapter 3, n. 24.

[21] For stylite practices in Late Antiquity see Lukas Amadeus Schachner, "The Archaeology of the Stylite," in *Religious Diversity in Late Antiquity*, ed. David M. Gwynn and Susanne Bangert (Leiden: Brill, 2010), 329–97. For the cult of St. Symeon see Antony Eastmond, "Body vs. Column: The Cults of St. Symeon Stylites," in *Desire and Denial in Byzantium*, ed. Liz James (London: Routledge, 2016), 87–100. See also Gary Vikan, "Art, Medicine, and Magic in Early Byzantium," *Dumbarton Oaks Papers* 38 (1984): 67–74

clay was vital to the healing process (see also section 4.2 for Islamic contexts).[22] Late antique and medieval pilgrimage art was replete with saintly imagery circumscribed by protective phrases such as: "Blessing of the lord of Saint Sergios," or "Lord, help" (see table 3, nos, 11 and 12).[23] The presentation of encircling text in this manner was a common trope in protection-seeking objects, also seen in "hystera" (womb) amulets, dated between the tenth and twelfth centuries, intended specifically to assist women (table 3, no. 13).[24] Similar visual representations of encirclement can be found in performative practices related to demonology in medieval Byzantium. In the so-called *Magical Treatise of Solomon*, which describes magical spells and instructions, the circle plays an important role: the magician creates a physical circle for the purposes of keeping the demons at bay, sequestering himself and his team of assistants inside the circle.[25] The circumference of the circle is also inscribed with magical text, actively protecting the

[22] For sensation as a source of knowledge as related to Saint Symeon, see Heather Hunter-Crawley, "Divinity Refracted: Extended Agency and the Cult of Symeon Stylites the Elder," in *Lived Religion in the Ancient Mediterranean World*, ed. Valentino Gasparini et al. (Berlin: De Gruyter, 2020), 261–86. For touching and ingesting practices in Byzantium and the Islamic world, see Finbarr Barry Flood, "Bodies and Becoming: Mimesis, Mediation and the Ingestion of the Sacred in Christianity and Islam," in *Sensational Religion: Sensory Cultures in Material Practice*, ed. by Sally M. Promey (New Haven: Yale University Press, 2014), 459–93.

[23] For further examples see also Gary Vikan, *Early Byzantine Pilgrimage Art* (Washington D.C.: Dumbarton Oaks Research Library and Collection, 2010).

[24] For hystera amulets and their dating, see Jeffery Spier, "Medieval Byzantine Magical Amulets and Their Tradition," *Journal of the Warburg and Courtauld Institutes* 56 (1993): 25–62. For the "wandering womb" and women's ailments in the Byzantine period, see Christopher Faraone, "Magical and Medical Approaches to the Wandering Womb in the Ancient Greek World," *Classical Antiquity* 30 (2011): 1–32.

[25] The content of the treatise can be traced to the sixth century AD, see Pablo Torijano, "Solomon and Magic," in *The Figure of Solomon in Jewish, Christian and Islamic Tradition*, ed. Joseph Verheyden (Brill: Leiden, 2013), 121–2. This Greek text is part of several Greek manuscripts. See also Pablo Torijano, *Solomon the Esoteric King: From King to Magus, Development of a Tradition* (Leiden: Brill, 2002), 157–60.

magicians.[26] In addition, the *Treatise* describes two concentric circles, circumscribed by a square; the latter representing the four directional points on a compass (for the square as representative of cardinal points, see Chapter 2), and the shapes together symbolizing the natural and the supernatural world.[27]

The abstract nature of the circle makes it particularly amenable for use in amuletic materials of Islamicate societies, often in an identical manner and embedded with similar cultural meanings as discussed in the Graeco-Roman and Byzantine materials above. They can be seen in block-printed amulets and seals (lead and carved gemstones) discussed in Chapter 3; in each case Arabic script or pseudo-script is arranged in circular patterns (table 3, nos. 14–20).[28] A particularly striking case is an eleventh-century paper amulet at the Metropolitan Museum (1978.546.32) in which a text-in-circle is bound by a square, in a manner similar to the Byzantine ritual performance described in the Solomonic treatise above (fig. 4.3). The design on the paper amulet includes a six-pointed star circumscribed by the circular arrangement. The likely reference of the star to the seal of Solomon (for more on five- and six-pointed stars, see Chapter 3), suggests an even closer connection with the ritual performances associated with Solomon. Part of the encircling text reads: "Glory be to God, Praise be to God, there is no god but God."[29] In

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[26] For magical circles in Byzantine demonology, see Richard P. Greenfield, *Traditions of Belief in Late Byzantine Demonology* (Amsterdam: Hakkert, 1988), 286.

[27] Greenfield, *Traditions*, 286.

[28] For block-printed amulets, see Chapter 3, n. 35; for carved gemstones in rings and seals see Chapter 3, n. 40–1.

[29] For a transcription and English translation of this objects, see Karl R. Schaefer, *Enigmatic Charms: Medieval Arabic Block Printed Amulets in American and European Libraries and Museums* (Leiden: Brill, 2006), 193–6.

another example with two concentric circles, a similarly bold Kufic script in reserve (or intaglio, that is, the letters are formed using negative space and the ink surrounds the letters) attracts the viewer's attention to the design. In one of the circles, the text carries chapter 112 of the Qur'an, invoking the oneness of God in an effort to seek protection (table 3, no. 16). Like the Linear Kufic, which is also dominant in magical designs, chapter 112 is one of the core components of Qur'anic vocabulary employed in amulets and talismans.[30] The xylographic amulets demonstrate a collision of the religious (Qur'anic text; attributes of God; pious phrases) and magical elements (Solomon's seal, Linear Kufic script; geometric forms). This intersection suggests that in the eyes of the medieval viewer, there was no distinct visual vocabulary to distinguish between the religious, pious phrases and the magical elements; that is, they integrated seamlessly.

Official seal impressions in lead and clay (*bullae*), dated between the eighth and tenth centuries, employ circular epigraphic frames reminiscent of amulets and coins (for coins, see also Chapter 5; for examples, see table 3, no. 17). Following Byzantine and Sassanian practices, seals were attached to documents and cloth sacks to physically seal their contents; they also served as proof of taxes for the non-Muslim population (*jizya*) in Iraq and the Jazira.[31] Both Byzantine and Sassanian seals were not only used as instruments of authentication, they were also carried by their users and worn on the body,

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[30] See Tewfiq Canaan, "Arabic Magic Bowls," *Journal of the Palestine Oriental Society* 16 (1936): 83–5.

[31] Petra Sijpesteijn, "Expressing New Rule: Seals from Early Islamic Egypt and Syria, 600–800 CE," *The Medieval Globe* Vol. 4, no. 1 (2018): 117. See also Nitzan Amitai-Preiss, "Early Islamic Lead Seals: Evidence for Commercial Connections," *Israel Numismatic Journal* 19 (2016): 106–14. Priscilla Soucek, "Early Islamic Seals: Their Artistic and Cultural Importance," in *Leaving No Stones Unturned: Essays on the Ancient Near East and Egypt in Honor of Donald P. Hansen*, ed. Erica Ehrenberg (Winona Lake: Eisenbrauns, 2002), 244; fig. 1.

either in the form of a necklace or a ring—a practice ubiquitous in Late Antiquity (see table 3, no. 21).[32] In the medieval Islamic world, seal impressions and by extension, seal matrices (official and personal) embrace both, the functional aspects of Late Antique design, and its role as protection—especially given the pious phrases and names that create a direct alliance with God.[33] Examples can be seen particularly in semi-precious stones that form a large category of seal matrices in the Islamic period, most of which were mounted on rings (table 3, nos. 18–20; and fig. 4.4).[34] The seals or seal-rings deliberately build on at least three visual elements to illustrate their potency: star and crescent shapes that signal astral connections[35]; Kufic script; and the circular arrangement of text. They also include protective phrases. The presentation of the inscription in a circular fashion meant that individuals would have had to look closely at the object to decipher the phrases, moving the object around as needed; alternatively, they would have been able to recognize certain words and then ascertain the entire inscription, or used the imagery to provide clues for the inscription. Even when the inscription is deciphered, the object is worn close to the body, and its visual presence was sufficient for activation. The

[32] For Byzantine sealing, see Nicolas Oikonomidès, *Byzantine Lead Seals* (Washington D.C.: Dumbarton Oaks, 1985). For Sassanian seals, especially the excavation at Qasr-i Abu Nasr, see Richard Frye, ed. *Sasanian Remains from Qasr-i Abu Nasr; Seals, Sealings, and Coins* (Cambridge: Harvard University Press, 1973).

[33] For magical functions of administrative seals, see Venetia Porter, "Islamic Seals: Magical or Practical?" in *Magic and Divination in Early Islam*, ed. Emilie Savage Smith (Aldershot: Ashgate, 2004), 179–200.

[34] See the catalogue: Venetia Porter, *Arabic and Persian Seals and Amulets in the British Museum* (London: The British Museum, 2011).

[35] See for instance the scorpion amulet, BM 1991, 0727.4. The star motif is also common in seal impressions, see Sijpesteijn, fig. 5.15. For the motif in Byzantine materials, see Spier, "Medieval Byzantine," plates 3–6.

letters in the circle provide a sense of continuous activation; one need not recite the phrases or read it repeatedly for the amulet to function.

4.2 Circular Enclosures: Divinatory and Talismanic Objects

This section considers two subcategories of magic: divination and talismans (for a definition of magic, see Introduction). More generally, divination is understood to be a prediction of future events.[36] Talismans, often used interchangeably with amulets, are specifically distinguished in Arabic textual sources (see also Chapter 5 for talismans in architecture). Historical sources such as the famous fourteenth-century historian, Ibn Khaldun, make particular note of objects and artefacts that are labelled talismanic. Ibn Khaldun defines a talisman as one that is based on the science of astrology; that is, a talisman attains power through its connections with the celestial world.[37] The author of the *Ghāyat al-ḥakīm* (see also Chapter 3), and Ibn al-Nadim's *Fihrist* (tenth-century bibliographic text), have also identified talismans as those that incorporate astrological expertise, including adhering to specific iconography and timing of production.[38] This

[36] See Emilie Savage-Smith, "Introduction," in *Magic and Divination in Early Islam,* ed. Emilie Savage-Smith (Aldershot: Ashgate, 2004), xiii. See also Edgar Francis, "Magic and Divination in the Islamic Middle East," *History Compass* 9/8 (2011): 622; Richard Kieckhefer, *Magic in the Middle Ages* (New York: Cambridge University Press, 1989), 85. The Arabic term *kihāna* is broader than divination, see Toufic Fahd, "Kihāna," in *Encyclopaedia of Islam*, Second Edition, accessed October 17, 2021, http://dx.doi.org/10.1163/1573-3912_islam_COM_0515. For a comprehensive study on this topic see Toufic Fahd, *La divination arabe: études religieuses, sociologiques et folkloriques sur le milieu natif d'Islam* (Leiden: Brill, 1966).

[37] Ibn Khaldun, *The Muqaddimah: An Introduction to History*, trans. Franz Rosenthal, vol. 3 (New York, Pantheon Books, 1958), 166.

[38] Liana Saif, *The Arabic Influences on Early Modern Occult Philosophy* (New York: Palgrave Macmillan, 2015), 28.

section will explicate the role of circular enclosures in objects specifically related to divinatory and talismanic practices.

Healing the body is one of the primary functions of many magical (and talismanic) materials. This aspect is quintessentially represented in the magic-medicinal bowls. The earliest examples of the hemispherical metal bowls are dated to the twelfth and thirteenth centuries, and are engraved with inscriptions, magical characters, and animal and humanoid figures on their inner and outer surfaces.[39] The inscriptions explicate the curative effects of several medical (and supernatural) conditions that one may achieve by drinking the water, charged by the engravings on the bowl. The use of a hemispherical bowl, the presence of inscriptions, the variety of encircling inscription designs, and the element of supernatural protection has prompted some scholarly inquiry into its continuity with the incantation bowls of Late Antiquity from Mesopotamia (see above).[40] While no ritual or material evidence provides evidence for an evolution from the incantation bowls to the Islamic magic-medicinal bowls, the marked visual continuity of script and circular patterns between the two is particularly striking—engaging with Late Antique and contemporaneous practices. The idea that words are powerful and potent when inscribed and can be harnessed to avert evil is a common trope prevalent in both Late Antique Mesopotamian and the Islamic-period bowls (see also Introduction). The inscribed image (whether that takes the form of a bound demon in the former, or

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[39] For an overview and examples of early magic-medicinal bowls, see Emilie Savage-Smith, "Magic-Medicinal Bowls," in *Science, Tools, and Magic*, vol. 1, ed. Francis Maddison et al. (London: The Nour Foundation in association with Azimuth Editions and Oxford University Press, 1997), 72–82; Henry Spoer, "Arabic Magic Medicinal Bowls," *Journal of the American Oriental Society* 55, no. 3 (1935): 237–56; and Annette Ittig, "A Talismanic Bowl," *Annales Islamologiques*, no. 18 (1982): 79–94.

[40] See Emilie Savage-Smith, "Popular Medicine," in *Medieval Islamic Medicine*, ed. by Peter Pormann and Emilie Savage-Smith (Edinburgh: Edinburgh University Press, 2007), 151.

images of snakes and scorpions in the latter) as a means to repel its like also features on both sets of bowls—the image exerts power. One of the earliest-dated of such objects is a densely inscribed bowl from Syria, dated 1169–70 AD at the Khalili Collection, MTW 1443 (table 3, no. 22). The bowl carries a series of circular inscriptions (in Linear Kufic) running along the interior and exterior of the surface amidst undulating patterns. A wider band of inscription runs around the outer rim of the bowl, distinguished from the rest through the use of a cursive *naskh* script, representing a sense of commencement or a closure to the plethora of engraved motifs. The inscription reads:

> This blessed (*mubārak*)[41] cup is for every poison. In it have been gathered proven uses, and these are for the sting for serpent, scorpion and fever, for a woman in labour, the abdominal pain of a horse caused by eating earth, and the [bites of] a rabid dog, for abdominal pain and colic, for migraine and throbbing pain, for hepatic and splenic fever, for [increasing] strength, for [stopping] haemorrhage, for chest pain, for the eye and vision [evil eye] (*al-'ayn wa'l-nuẓrah*), for opthalmia and catarrh, for *riyāh al-shawkah*, for [driving out] spirits (*arwāḥ*)[42], for releasing the bewitched, and for all diseases and afflictions. [If] one drinks water or oil or milk from it, then they will be cured, by the help of God Almighty. It was prepared [while] the sun was in Leo and engraved for the sultan al-Malik al-'Adil Mahmud ibn Zangi in the year 565.

The inscription is informative in several ways. Outlining the various ailments, from snakebites to abdominal pain to the averting of evil spirits, the bowl presents a medieval

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[41] The term '*mubārak*' (blessed) frequently appears in magical materials. For other examples, see the Arabic inscription in Henry Spoer, "Arabic Magic Medicinal Bowls," *Journal of the American Oriental Society* 55, no. 3 (1935): 255; and the Arabic text of magic mirror dated to 1153 AD in Anne Regourd, "A Magic Mirror in the Louvre and the Additional Observations on the Use of Magic Mirrors in Contemporary Yemen," in *Word of God, Art of Man*, ed. by Fahmida Suleman (Oxford: Oxford University Press in association with the Institute of Ismaili Studies, 2010), 148. The term is also used in the diagrams of the *Kitāb al-diryāq*.

[42] Canaan (1936; p.114) translates *arwāḥ* as "malicious spirits"; Spoer (1935; p.256) translates it as "flatulence." See Emilie Savage-Smith, "Magic-medicinal bowls," in *Science, Tools & Magic*, vol. 1, Francis Maddison et al. (London: The Nour Foundation in association with Azimuth Editions and Oxford University Press, 1997), 82, n.5. The term *arwāḥ* is also used in the diagrams of the *Kitāb al-diryāq*. It reads: *amīn al-arwāḥ*, which can be translated best using Canaan's version, as "guardian of the malicious spirits."

approach to health that intertwines the natural and the supernatural (for the similarity of the inscription with the benefits described in the *Kitāb al-diryāq*, see Appendix). The talismanic nature of the bowl is emphasized by the explicit mention of the timing of the engraving; that is, when the planet (sun) was in motion through the constellation, Leo. In this way, the images harness the celestial powers to aid in the healing process. Finally, is the name of the patron, Nur al-Din Mahmud ibn Zangi (r. 1146–74). During his reign, Nur al-Din also commissioned a version of a hospital, the *Bimaristan* in Damascus. The medieval worldview on healing can therefore be seen as wide-ranging, from its focus on the balance of humors, to astrological conditions, to the inclusion of supernatural measures. In addition to the wide encircling band, a radial design composed using magical script demarcates the center of the bowl, on its exterior.

A performative ritual accompanies the bowl: the afflicted individual must drink the water (or oil/milk) that has been suffused with the haptic power of the words and images engraved on the bowl. The individual imbibes not only the intangible potency of the images, but also their visual forms. The engraved content transfers from the bowl to the liquid by means of physical contact, and similarly from the liquid into the body — this movement of the sacred through touch has been discussed with respect to the Greek Magical Papyri and the tokens of St. Symeon, and is a trope prevalent across the medieval Mediterranean.[43] The ritual exemplifies the significance attributed to the word and names of God; however, one might also consider the role of the visual form of the inscriptions within the healing process, particularly the use of circular compositions. If power transmits through physical contact, then the liquid and the body would imprint the

[43] For more on ingesting the sacred, see Flood, "Bodies," 459–93.

visual image embodying the efficacious power. This idea is analogous to the seals; physical contact from the seal-matrix to the stamped image transfers both the visual form and the intangible properties embedded within it — *khātim* referring to the seal-matrix and the stamp. Accepting this proposition also provides an explanation for the replication of certain visual forms, in that the compositions themselves (rather than the meaning of the words, though not exclusively) are activated through the sensory medium, such as touch or sight. It is interesting to note that the association between the circular form and Arabic script as markers of magic extended into Byzantine societies, such as exemplified by a divination bowl at the treasury of the church of San Marco, Venice, dated between the tenth and twelfth centuries (table 3, no. 24).[44] The bowl carries pseudo-Arabic script in a radial pattern along the inner rim, and on the bottom of the bowl's exterior.[45] The presence of pseudo-Arabic script in this manner does not resemble the magical writing characteristic of the Islamic magic-medicinal bowls, thus there is no evidence of a direct connection between the two. However, the San Marco bowl forges an association between pseudo-Arabic script and magic; furthermore, the circular construction of the pseudo-script illustrates a shared embodiment of magic in the medieval Mediterranean. [46]

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[44] For an extensive discussion of this object, see Alicia Walker, "Meaningful Mingling: Classicizing Imagery and Islamicizing Script in a Byzantine Bowl," *The Art Bulletin* 90/1 (2008): 32–53.

[45] Pseudo-Arabic (script meant to resemble Arabic text) was seen across Byzantium between the tenth and the twelfth centuries. For an overview of this topic see Silvia Pedone and Valentina Cantone, "The Pseudo-Kufic Ornament and the Problem of Cross-Cultural Relationships between Byzantium and Islam," *Opuscula Historiae Artium 62* (2013): 120–137. For pseudo-Arabic in Byzantium see Alicia Walker, "Pseudo-Arabic 'Inscriptions' and the Pilgrim's Path at Hosios Loukas," in *Viewing Inscriptions in the Late Antique and Medieval World*, ed. Anthony Eastmond (New York: Cambridge University Press), 99–123; in Italy, see Clare Vernon, "Pseudo-Arabic and the Material Culture of the First Crusade in Norman Italy: The Sanctuary Mosaic at San Nicola in Bari," *Open Library of Humanities* 4/1 (2018): 1–36, doi.org/10.16995/olh.252.

[46] The connection of pseudo-Arabic script with magic is also proposed by Walker in the context of the medieval Byzantine monastery, Hosios Loukas, in Phokis, Greece. See Walker, "Pseudo-Arabic."

Sitting at the intersection of reflective surfaces, supernatural healing, and divination are the magic mirrors, attributed to Iran and Anatolia in the twelfth and thirteenth centuries.[47] As on the magic-medicinal bowls and the San Marco divination bowl, there is a propensity to incorporate inscriptions along the circumference of the round, sand-casted metal objects. One of the earliest-dated objects (548 AH/ 1153 AD; table 3, no. 25)[48] bears the circular inscription (in the *naskh* script) that closely resembles its function to the magic-medicinal bowls:

> In the name of God, this blessed (*al-mubāraka*) mirror (*mir'āt)* was made during an ascendancy of auspicious (*mubārak*) and blessed forecasts, and God willing, it will be useful (*tanfa'*) [in curing] the paralysis of the mouth, for the pains of childbirth, and for other forms of suffering and pain, which will be cured with the permissions of God … Made of seven [different] metals, at the time of the passage of the sun in the sign of the Ram.[49]

Not only is the mirror contemporaneous with the production of magic-medicinal bowls, both inscriptions incorporate similar vocabulary: the use of the word *mubārak* for the opening statement; the list of therapeutic properties; and ending with the astrological condition of production (all of which are also part of the *Kitāb al-diryāq*, see Chapter 1). Within the mirror's epigraphic enclosure is the depiction of seven planets in roundels, encircling a central one. This mirror is the earliest known object to include astrological

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[47] For magic mirrors see Charles Pellat, "Mirʾāt," in *Encyclopaedia of Islam*, Second Edition, accessed July 14, 2020, http://dx.doi.org/10.1163/1573-3912_islam_SIM_5217; Emilie Savage-Smith, "Talismanic Mirrors and Plaques," in *Science, Tools, and Magic*, 124–125; Umberto Scerrato, "Specchi islamici con sfingi scorpioniche," *Arte Orientale in Italia* 5 (1980): 61–94; and Yuka Kadoi, "Translating from Jing to Mir'āt/ā'īna: Medieval Islamic Mirrors Revisited," *Art in Translation* 5, no. 2 (2013): 251–272.

[48] A likely earlier example exists, engraved with a date of 111AH/ 729–30 AD and inscribed with the name of Sharif Idris II (r. 793–828) of Morocco. Anne Regourd, however, attributes the mirror to the eleventh century AD based on its epigraphy. This inscription also takes the form of a circular pattern around the circumference. See Regourd, "A Magic Mirror," 141.

[49] Regourd, "A Magic Mirror," 148.

personifications in metalwork.[50] The decoration and inscription corroborate the talismanic significance of the object, and an inherent affiliation with magic-medicinal bowls. I am stressing this affinity because magic mirrors also bear inscriptions that conspicuously delineate their function for divination in the same time period. A mirror dated to the early thirteenth century at the Metropolitan Museum (MMA 15.43.285; table 3, no. 26) features a Kufic inscription on its margin:

> Oh God, I invoke Thy sublime Name! God, the Only and Eternal God – I have sworn to Thee by the truth of these names, the angel who watches over Saturn, … sworn by the Master whose works encompass all names and every name, that Thou shouldn't send me one of Thine angels into this, my mirror, who shall inform me of everything I ask him about what comes to pass in this world and the next. And, by the Lord of Heaven: Thou hast sent me an essence of Thy mighty and intensive spirituality which comes down to me in this mirror and reveals itself to me. He tells me everything which I ask him and obeys me in everything which I order him to do …. Whosoever only sees themselves in their dirty and impure state of being, the blame lies with them – and so be it / peace be with God.[51]

The language in this inscription markedly differs from that of the earlier mirror, both in terms of epigraphic style as well as the nature of its content. The vocabulary of the inscription more closely resembles the incantations and procedures described in the magical treatise of the *Ghāyat al-ḥakīm*, invoking planets, angels, and spirits (*rūḥāniyya?*) for the fulfilment of worldly gains (see Chapter 6 for more on spirits and *rūḥāniyya*).[52] The content reveals the significance of the mirrored reflection as an aid for

[50] Astrological personifications are abundant in medieval Islamic metalwork. See Eva Baer, *Metalwork in Medieval Islamic Art* (Albany: State University of New York Press), 249–50. For their use across media see Sheila Blair, Deniz Beyazit, Martina Rugiadi, and A. C. S. Peacock, eds., *Court and Cosmos: The Great Age of the Seljuqs* (New York: Metropolitan Museum of Art, 2016).

[51] "Bronze mirror with sphinxes and kufic inscription," Museum With No Frontiers, accessed July 13, 2020, http://islamicart.museumwnf.org/database_item.php?id=object;EPM;de;Mus21;20;en

[52] For the intersections between magical treatises and medicine, see Liana Saif, "Between Medicine and Magic: Spiritual Aetiology and Therapeutics in Medieval Islam," in *Demons and Illness from*

knowledge about the future (divination). The practitioner would be able to see this knowledge only through the reflective mechanism of the object. This functionality of the mirror might explain its name, *mir'āt*, meaning literally to see (*rā'a*);[53] one not only can see oneself, but the reflective technology allows for the manifestation of the unseen.[54] In a more recent example, Anne Regourd examines a mirror from late-nineteenth century Yemen that highlights a continuation of a magical practice, one that intertwines elements of performative ritual, supernatural healing, divination, and its visual embodiment. Rather than a divination tool, the mirror functions as a therapeutic device, similar to the earliest-dated mirror discussed above.[55] However, the accompanying ritual is identical to the divination practice using mirrors that Ibn Khaldun mentions; that is, the individual gazes and contemplates at the polished surface.[56] Doing so, in tandem with the oral incantations, would attract the *jinn*s to the reflective surface where they would perish immediately by witnessing their own image in the mirror.[57] This theory of "like repels like" is a common magical device more generally in the medieval Mediterranean region (see also Chapter 5).[58] Of significance here is that the reflective surface attracts the

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Antiquity to the Early-Modern Period, ed. by Siam Bhayro and Catherine Rider (Leiden: Brill, 2017), 313–338.

[53] Pellat, "Mir'āt."

[54] Pellat discusses some medieval perspectives regarding the nature of images appearing in mirrors, including that of al-Jahiz (d. 868–9), Ibn al-Haytham (d. 839) and al-Qazwini (d. 1283).

[55] Regourd, "A Magic Mirror," 144–7.

[56] Ibn Khaldun, *The Muqaddimah*, 216–7.

[57] Regourd, "A Magic Mirror," 147. This can be compared to the demon-traps seen in Coptic textiles where the pattern takes the shape of knots and interlacing bounded by a circular frame.

[58] This trope is particularly observed in architecture. See Persis Berlekamp, "Symmetry, Sympathy, and Sensation: Talismanic Efficacy and Slippery Iconographies in Early Thirteenth-Century Iraq, Syria, and Anatolia," *Representations* 133, no. 1 (2016): 59–109; and Finbarr Barry Flood, "Image

unseen whether it is for the purposes of divination or for healing the body. This concept is applicable in the context of the magic-medicinal bowls as well, in that the reflective quality of water allows for the appearance of the unseen entities. And this explains the rationale behind the use of a proxy who could drink water from the bowl on behalf of the afflicted individual; in this scenario, the water does not touch the sick, but the ritual would have allowed for the *jinn* to be captured — and perhaps perish — by means of the reflective substance. Finally, and most importantly, is the addition of magical writing (allegedly Himyarite) on the Yemeni mirror in a circular pattern, as a way to enclose and bind the evil spirits — echoing its medieval counterparts. The unseen world is attracted to the reflective surfaces of mirror and water, by writing that is incomprehensible to the world of man (hence understood by the spirits) and trapped by the circular enclosure.

Horoscopes further underscore the relationship between the circle and divination. From antiquity, drawings on graffito and papyri using Greek script illustrate circular horoscopes as the only visual mode of representation, observed in regions of Egypt and Palestine.[59] In fact, the Greek word circle was synonymous with a "zodiacal circle," emulating the cosmological pattern of fixed stars prescribed by Ptolemy.[60] In the medieval period, however, Greek, Arabic, and Hebrew materials predominantly feature quadratic constructions, which is likely the result of knowledge sources from China

against Nature: Spolia as Apotropaia in Byzantium and the Dār al-Islām," *The Medieval History Journal* 9, no. 1 (2006): 143–66.

[59] Johannes Thomann, "Square Horoscope Diagrams in Middle Eastern Astrology and Chinese Cosmological Diagrams: Were These Designs Transmitted through the Silk Road?," in *The Journey of Maps and Images on the Silk Road*, ed. Philippe Forêt and Andreas Kaplony (Leiden: Brill, 2008), 97–103.

[60] Thomann, "Square," 98.

westwards on the Silk Road (see Chapter 3 for quadratic horoscopes).[61] While there is a paucity of horoscope diagrams from the fourth to the tenth centuries, Greek literary sources include references to circular diagrams that would have been drawn in sand or dust. In the Islamic period, Abu Masha'r al-Balkhi's (787–886) guide for constructing a birthday horoscope corroborates the acceptance of the radial pattern even in the medieval period (see Chapter 3)—the circular form representative of the celestial world.[62] An illustrious double-page horoscope presented in a manuscript commissioned for Jalal al-Din Iskandar Sultan ibn 'Umar Shaykh (r. 1409–1414) at the Wellcome Library, MS Persan 474, demonstrates a continued practice of circular horoscopes into the fifteenth century.[63] This section has examined circular patterns of script on materials classified as talismanic or divinatory, illustrating the symbolic affiliation of the shape with the internment of demons and venomous creatures on one hand, and the representation of the night sky on the other. In both instances, the shape provides the practitioners with a sense of control of their well-being in the case of the magic-medicinal bowls, or of knowledge about their future in the case of the horoscopes.

4.3 Circles in Late Antique Philosophy and Sufi Thought

Physical and metaphysical ideas were widespread and intertwined in Late Antiquity. The circle as representative of the cosmos and the human body thus infiltrated all aspects of

[61] Thomann, "Square," 114.

[62] Thomann, "Square," 110. See chapter 3 for a complete quote.

[63] For the Iskandar horoscope see Fateme Keshavarz, "The Horoscope of Iskandar Sultan," *Journal of the Royal Asiatic Society of Great Britain and Ireland* (1984): 197–208.

intellectual, cultural, and religious thought in Late Antiquity.[64] Since antiquity, if not earlier, the geometric form of the circle and its three-dimensional counterpart, the sphere, has been accorded an elevated status. In the *Timaeus* of Plato (d. 348–7 BC), cosmological representations take the shape of a circle as the "rounded spherical shape [is] … a figure that has the greatest degree of completeness and uniformity."[65] Aristotle (d. 323 BC) similarly expounds on the perfection of the circle and its superiority of form amongst other shapes. Not only do the planets, but also the heavens follow a circular trajectory, making the circle the shape that defines the divine world.[66] In Late Antiquity, Plotinus (d. 270 AD)—known as the founder of Neoplatonism—builds on such classical ideas by drawing parallels between the divine world and the world of man through the notion of corresponding "souls." He describes the "world soul" operating in a circular pattern, following an endless cyclical route that moves around a center.[67] The soul in the human body emulates this course.

Neoplatonist ideas permeated the Islamic realm, spreading not only in philosophic circles (*falsafa*), but also in esoteric and mystical thought, including Sufism (see Glossary for definitions). The Neoplatonic theories, more generally, prescribed an emanation

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[64] For a complete discussion see Gregory Smith, "Physics and Metaphysics," in *The Oxford Handbook of Late Antiquity*, ed. by Scott Fitzgerald Johnson (Oxford: Oxford University Press, 2012), 513–61.

[65] G. Lee, ed. and trans., *Plato, Timaeus and Critias* (London, 1977), 45, quoted in Keith Lilley, *City and Cosmos: The medieval world in urban form* (London: Reaktion Books, 2009), 28. For the reception of Timaeus in Late Antiquity and the Islamic world, see Aileen Das, *Galen and the Arabic Reception of Plato's Timaeus* (Cambridge: Cambridge University Press, 2020).

[66] Ahmet Karamustafa, "Cosmographical Diagrams," in *The History of Cartography*, ed. by J. B. Harley, David Woodward, and Mark S. Monmonier (Chicago: University of Chicago Press, 1987), 71–2.

[67] Smith, "Physics," 533. For Neoplatonism see also see Peter Adamson, "Neoplatonism" in *Encyclopaedia of Islam,* Third Edition, accessed September 28, 2021, http://dx.doi.org/10.1163/15733912_ei3_COM_41019.

starting from the One, the Supreme Being. The Intellect descends from the One, followed by the Soul. The soul in the body of man is ultimately able to connect with the world-soul through the act of contemplation.[68] The prevalence of metaphysics in Neoplatonic theories made it particularly amenable for mystical and esoteric advancement, and Christian and Jewish practices also drew significantly from such materials.[69] The Neoplatonic writings not only describe some of the physical characteristics and movements of elements—such as the circular movement of the soul—but also present diagrams to illustrate their discussions. In Macrobius' (d. 430) *Commentary on the Dream of Scipio*, a fifth-century text, the author represents the movement of the celestial bodies through a set of concentric circles. He explains: "since our eyes often open the way to the understanding of a problem, it would be well to draw a diagram."[70] In addition to the role of circular patterns, the author also outlines the primary reason for the construction of the diagrams; that is, thinking through visualization (see also Chapter 6). The philosophers writing in the Islamic period adopted the Neoplatonic theories, as well as the visual representation of the theories, dominated by the circular form.[71]

Many of the esoteric and mystical diagrams use the circular form as a means to illustrate relationships, such as the use of concentric circles; or for divisional purposes,

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[68] Sarah Klitenic Wear, "Neoplatonism," in *Oxford Bibliographies Online*, accessed 5 June 2020, https://www-oxfordbibliographies-com.ezproxy.library.uvic.ca/view/document/obo-9780195389661/obo-9780195389661-0201.xml. For Neoplatonism in Islam, see Adamson, "Neoplatonism."

[69] For Jewish examples, see Marla Segol, *Word and Image in Medieval Kabbalah* (New York: Palgrave Macmillan US, 2012); for Christianity, see Thomas Finan and Vincent Twomey, eds. *The Relationship between Neoplatonism and Christianity* (Dublin: Four Courts Press, 1992).

[70] W.H.Stahl, trans. Macrobius' Commentary on the Dream of Scipio (New York, 1952), 175, quoted in Lilley, *City and Cosmos*, 30.

[71] For diagrammatic examples, see Karamustafa, "Cosmographical Diagrams," 71–89.

such as spokes or radial lines (see section 4.4 and 4.5 below)—the circle being integral to such depictions. Building on the Aristotelian cosmologies that the notion of the sphere was the most perfect of all forms, a prolific Islamic cosmographer, Haydar Amuli (1320–1385) writes:

> The form of the world, the heavenly spheres, the bodies, and the [four] elements was made spherical, since the spherical, round form is the best of all forms, as it is said: "The best of all forms is the circular form." If a form more beautiful and more perfect than the circular form were to be possible, then the world would have been created in that form ...[72]

This sense of God's perfection, embodied in the circle, is exploited in esoteric and mystical literature. As these realms of thought build on cosmological ideas, there are visual parallels with the scientific/philosophical illustrations (for circular diagrams in scientific treatises see Chapter 2). However, conceptions of the metaphysical and esoteric principles in Islamic thought harness the geometric form of the circle, literally and metaphorically, to articulate the relationship of man with the divine.

In the medieval Islamic mystical writings, God/Essence is illustrated as a dot in the center of the circle. The circumference around the dot represents God's manifestation. In the *Ṭawāsīn*, Mansur al-Hallaj (d. 922), proclaimed for his radical views of the conflation of man and God, explicates: "this circle has no door … and the point in the middle of the circle is the meaning of truth."[73] Echoing the Late Antique conceptions of the soul and the *pneuma*—the latter encircling the central soul—Islamic mystical ideas

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[72] Sayyid Baha' al-Din Haydar ibn 'Ali al-'Ubaydi al-Husayni Amuli, *al-Muqaddimāt min kitāb naṣṣ al-nuṣūṣ fi sharḥ fuṣuṣ al-ḥikam* (The prefatory sections from the Book of the Text of Texts on the interpretation of The Bezels of Wisdom), translated in Karamustafa, "Cosmographical Diagrams," 74.

[73] Al-Husain b. Mansur al-Hallaj, *Al-Ṭawāsīn wa Bustān al-Ma'rifa* (Damascus: Dar al-Yanabi', 1994), 51, translated in Samer Akkach, *Cosmology and Architecture in Premodern Islam: An Architectural Reading of Mystical Ideas* (Albany: State University of New York Press, 2005), 64.

similarly seek to articulate the metaphysical by incorporating geometric analogies. In addition to the radial pattern that defies linearity, the circle has a defining center that produces an infinite series of equal positions from the center to the circumference, that is, the radii. The centerpoint of the circle is as significant as, if not more than, the circle itself. Employing the geometric components of the circle, Muhyi al-Din b. ‘Arabi (d. 1240), the eminent Sufi master, deconstructs its symbolic affinities with mystical knowledge, iterating the dependency of the circumference to that of the central dot:

> Every line projecting from the center to the circumference is equal to its companion and terminates at a point on the circumference. In itself the center neither multiplies nor increases despite the multitude of lines that project from it to the circumference. The point of the center relates to every point on the circumference by its same essence.[74]

This spatially uniform relationship between the center and its infinite projections to the circumference signifies God’s manifestation as a reflection of him. As the radii emanate from the central point outwards, they carry the essence of God with them. Ibn ‘Arabi further adds: “the world is between the center and the circumference: the center is the first, and the circumference is the last.”[75] Aligning broadly with the Neoplatonic doctrines of a central entity and its visualization using the circle and its central point, mystical treatises also adopt this geometric form. The division of the circle in the form of radial lines (or spokes) make it particularly conducive for the visualization of the central force and its dependents. As such, this visual device is also appropriated in esoteric circles, such as in the writings of the Isma‘ili judge, al-Qadi al-Nu’man (d. 974).[76] In the

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[74] Muhyi al-Din Ibn ‘Arabi, *Al-Futūḥāt al-Makkīyya*, 1:260, translated in Akkach, *Cosmology*, 69.

[75] Ibn ‘Arabi, *Al-Futūḥāt,* translated in Akkach, *Cosmology*, 71.

[76] For more on Ismai‘lism and al-Qadi al-Nu’man, see Ismail Poonawala, “Al-Qadi al-Nu‘man and Isma‘ili Jurisprudence,” in *Mediaeval Isma‘ili History and Thought*, ed. Farhad Daftary (Cambridge: Cambridge University Press, 1996) 117– 43.

Da'āim al-Islām (The Pillars of Islam), the author presents an identical diagram—circle with a central dot—to represent the distinction between esoteric/essence (*bāṭin*) and the exoteric (*ẓāhir*). The dot illustrates the essence (*bāṭin*), through the recognition of the living Imam; the circumference (*ẓāhir*) represents the concrete, visible religion, such as ritual practices.[77]

The nature of God in the Qur'an is interpreted more generally using the analogy of a circle. The Arabic word for "circumference" is *muḥīṭ*, one that linguistically means "surrounding" and "encompassing."[78] References to the nature of God in the Qur'an often include the term *muḥīṭ* to allude to the encircling and all-encompassing properties of God. For instance: "God surrounds (*muḥīṭ*) them all" (Q85: 20) refers to the protective powers of God; in Q65:12 " … His knowledge encompasses (*aḥāṭ*) everything" is highlighted after reference is made to the seven heavens and the earths; and in the discussion of resurrection, Q41:54 attests that "…He it is Who is surrounding (*muḥīṭ*) all things!" Rather than a detailed explication of the nature of the circle, the Qur'an merely provides a broad allusion to God's power as that of a circumference of a circle, enclosing everything within its borders. Ibn 'Arabi builds on this Qur'anic imagination to explain man's relationship with the divine:

> Do you not see that when you start drawing a circle ... you do not stop drawing it until you reach its beginning [point] and [only] then it is a circle? If this was not the case so that we were to have originated from him in a straight line, we would not return to him, and his word would not be true, and yet he is the truthful one and to him shall you return. Thus everything and every being is a circle returning to him from whom it originated.[79]

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[77] For a detailed explication of this concept and its manifestation in material culture, see Irene Bierman, *Writing Signs: The Fatimid Public Text* (Berkeley: University of California Press, 1998), 66–8.

[78] Akkach, *Cosmology*, 72, n.58.

[79] Ibn 'Arabi, *Al-Futūḥāt,* translated in Karamustafa, "Cosmographical Diagrams," 74.

In this example, Ibn ‘Arabi references the verses of the Qur’an that speak on man’s genesis from and a return back to God, using the circle to help articulate the journey. The author provides an alternate geometric example, that of a straight line, to further elucidate that the circle is the best means of tracing the trajectory of man’s soul.

As Ahmet Karamustafa discusses, many of the diagrams in the mystical treatises were not merely a supplement to the textual commentaries; rather, they were didactic tools that were structurally sound and independently intelligible, without the need for an accompanying text.[80] Like Macrobius’s comment discussed above, the diagrams provide a basis for visual comprehension since they do not merely complement, but rather elevate the commentaries. And oftentimes, as the examples below will demonstrate, the diagrams themselves become the source of perceived power/contemplation, superseding its textual counterpart. The significance of the circular diagram is not difficult to conceive, given the numerous textual discussions cited above, providing visual tools for participants to engage in the practice. The writings of al-Buni (d. ca 1225 or 1232–1233; for more on al-Buni and quadratic images, see Chapter 3), contain a vision wherein the “Highest name of God” appeared to him, enclosed within two concentric circles:

> I was in solitude. There appeared to me an image in a circle, and in it was the Image of Majesty, and this is the Mightiest Name of Allah … As this image was implanted in my memory and heart, after the state (in which I had been) had ceased to be, and the luminous image had disappeared, I drew its likeness upon paper.[81]

[80] Karamustafa, “Cosmographical Diagrams,” 74.

[81] al-Buni, *Shams al-ma‘ārif al-kubrā* (Cairo, 1904–6), vol. I, 41–2, translated in Spoer, “Arabic Magic Medicinal Bowls,” 239.

This example suggests that the diagrams are a direct manifestation of the author's visions. As such, they take precedence over textual discussions. The prose text, in fact, is subservient to the image. The image of the name of God enclosed within two concentric circles, is far from inventive in the medieval period. This picture would have been very familiar to his audiences (Muslim and non-Muslim) across the Mediterranean (if not beyond), corroborated in material culture discussed in this section. In particular, the image resembles the compositions found on Greek Magical Papyri and Late Antique pilgrim souvenirs. In another place, al-Buni highlights the role of the circle as a means of enclosing its contents, precisely as witnessed in the Late Antique materials, labeling one such amulet as *dā'irat al-'iḥaṭa*, the "circle of enclosure."[82] Al-Buni's quote cited above narrates a performative ritual, involving a period of solitude and likely, contemplation. One might conjecture that the purpose of reproducing the image on paper would be to allow his audience to partake in the mystical experience of the divine, through contemplation, and with the aid of his diagram. The circular device acts as a means to access the divine through an embodied experience. The examples in this section illustrate that the circle was perceived as the most perfect of the visual forms, and thus was used as a metaphor to explicate Late Antique metaphysical thought and medieval Islamic mystical pursuits.

4.4 Spirals and Concentric Circles

Although they employ the circular form as their basis, the visual techniques of spirals and concentric circles function in a slightly different capacity than enclosing or framing

[82] al-Buni, vol. III, 58, translated in Spoer, "Arabic Magic Medicinal Bowls," 239.

elements. The spiral motifs generally start from the innermost point, rotating either a couple of times or taking several turns to form the spiral design. Script presented in this fashion illustrates a sense of visual continuity of the circle; there is no closure as with a complete closed circle. More often, the spiral pattern employs script independently without any geometric accompaniments—a feature more observable in the spiral than the round circle/s. Based on the significance of performative rituals in Late Antique objects as discussed in the last section, the visual continuity of script in the spiral design suggests an imprint of oral incantations, prevalent in Greek Magical Papyri as well as the Mesopotamian incantation bowls (table 3, nos. 27 and 28). While this might be the case, Daniel Waller argues that the spiral design on the objects was a direct corollary of visual thinking, not based on the "phenomenology of sound, but sight."[83] The spiral designs on both the incantation bowl and the papyri resemble a maze of sorts, forming a more intricate pattern of trapping the demons. Such spiral forms can also be seen in objects associated with magic from the Islamic world, such as inscriptions of *Sūrat al-Ṛahmān* (Q55) covering an unglazed ceramic jug from eighth- or ninth-century Raqqa; and tighter spiral motifs of protective and supernatural invocations inscribed inside magic-medicinal bowls, discussed in Section 4.2 above.[84]

Concentric circles, on the other hand, represent spatial relationships and indicate hierarchies between the nested shapes. The diagrams are pervasive in esoteric and

[83] Daniel James Waller, "Transferring Performativity from Speech to Writing: Illocutionary Acts and Incantation Bowls," *Bulletin of the School of Oriental and African Studies* 82, no. 2 (2019): 241.

[84] See Marcus Milwright, "An Inscribed Jug from Raqqa: Scripture and the Expression of Identity," in *Intersections: Visual Cultures of Islamic Cosmopolitanism*, David A. Cofrin Asian Art Manuscript Series, ed., Melia Belli Bose (Gainesville: University of Florida Press, 2021), 22–39; for spiral inscriptions on a magic-medicinal bowl, see Ittig, "A Talismanic Bowl," 87–8.

mystical treatises of the medieval period. The earliest examples are of the diagrams attributed to the semi-legendary figure, Jabir ibn Hayyan (d. ca. 815). Renowned for his alchemical innovations, Jabir has had attributed to him a corpus that includes philosophical, pharmacological, and metaphysical materials, as well as works on poison, magic, and talismanic treatises.[85] The entire corpus of works attributed to Jabir can be dated to no later than the end of the eleventh century.[86] In one of the treatises attributed to Jabir, *Kitāb al-Taṣrīf* (Book of Morphology), he explicates his cosmological perspective using a series of diagrams—the building blocks for his discourse being the Aristotelian geometric conceptions, Ptolemaic cosmology, and the Neoplatonic theories, particularly that of emanation.[87] Building on the shape of the circle used to represent the spheres of the cosmos (see Chapter 2 for examples), the circle was employed to represent the material, planetary, and the metaphysical worlds—a series of concentric circles visualizing the hierarchies. According to Jabir, the outer circle represents the world of substance (*ʻālam al-jawhar*), with the world of simple elements (*ʻālam al-ʻānāṣir al-basā'iṭ*) residing within it: "let us, then, visualize inside the Circle of Substance another Circle whose size is unknown. This latter is the Circle of Simple Elements, namely hot, cold, dry, and moist."[88] In this way, Jabir's cosmology is constructed using several

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[85] For the so-called Jabir problem and Jabir's corpus, see Regula Forster, "Jābir b. Ḥayyān", in *Encyclopaedia of Islam*, Third Edition, accessed July 18, 2020, http://dx.doi.org/10.1163/1573-3912_ei3_COM_32665; and Syed Nomanul Haq, *Names, Natures and Things: The Alchemist Jābir Ibn Ḥayyān and His Kitāb al-Aḥjār (Book of Stones)* (Dordrecht: Kluwer, 1994).

[86] Karamustafa, "Cosmological Diagrams," 81.

[87] Haq, *Names*, 50–1. See also Paul Kraus, ed., *Jābir ibn Ḥayyān. Contribution à l'histoire des idées scientifiques dans l'Islam*, 2 vols. (Paris: Les Belles Lettres, 1986).

[88] Jabir ibn Hayyan, *Kitāb al-Taṣrīf (Book of Morphology)*, in Paul Kraus, ed., *Essai sur l'histoire des idées scientifiques dans l'Islam*, vol. 1 (Paris: Libraire Orientale et Américaine, 1935), 392–424, quoted in Haq, *Names*, 73. n. 80. For a discussion of this topic, see Haq, *Names*, 55–8.

circles, nested within one another, illustrating a visual hierarchy and dependency of one with the other. The world of substance is enclosed within three concentric circles that illustrate the first four "hypostases" of Jabirian cosmology, each labelled as *al-dā'ira* (table 3, no. 29). In Paul Kraus's edition, the author explicates the diagram first, and subsequently the diagram is introduced as: "and this is the image/form of the circle (*wa-hadhihi ṣūra al-dā'ira*)."[89] Both—the diagram as a set of concentric circles and its label as *al-dā'ira*—can be seen as part of the final diagram (Diagram 9) of the *Kitāb al-diryāq* (see also Chapter 6). The Jabirian diagram in the Kraus edition employs script as a way to label the circles; for each of the three circles, the accompanying script is manipulated to span the entire circumference. In addition to the visual hierarchy of nested circles, the scribe underscores the stages (*marṭaba*) in the text as well, providing a numerical chronology of the states of creation.[90] This relationship between the script and the geometric form appears throughout the treatise. In many of the diagrams, the geometric compositions are labeled as *dā'ira*, *ṣūra* or *mithāl*. However, on one occasion, the author uses the term *shakl* to label the circles, as well as their chronological order (table 3, no. 30). [91] The presentation of diagrams in concentric circles, the manipulation of script, the nomenclature employed (*shakl*), presentation of recipes (*marṭaba* and four degrees; the repetition of *min kul wāḥid*; use of cells) exhibits much similarity with the *Kitāb al-diryāq* (for a detailed discussion of comparisons between the two treatises and nomenclature, see Chapter 6). It must be noted that the diagrams discussing Jabir's

[89] Kraus, *Essai*, 408. Translated by author.

[90] I am emphasizing this here as the *Kitāb al-diryāq* similarly has these stages/levels (*marṭaba*).

[91] Kraus, *Essai*, 443.

syncretic cosmology are not from original manuscripts. However, they are one of the few instances where early occult conceptions of the world are translated into visual images—with intersections in the realm of medicine.[92]

Philosophical, magical, and mystical treatises also adopt the concentric circle design that illustrates and builds on the Ptolemaic cosmological model. For instance, in the *Rasā'il Ikhwān al-ṣafā'* (discussed in the previous chapter), diagrams of concentric circles represent the stationary Earth at the center, followed by the spheres of Air, Moon, Mercury, Venus, Sun, Mars, Jupiter, Saturn, and the sphere of Fixed Stars (the zodiac).[93] The final sphere is the *falak al-muḥīṭ*, which can be translated as the "encircling sphere" or the "sphere of spheres," closely corresponding to the Qur'anic discussion of God's power as *muḥīṭ* (table 3, no. 31). Although Ptolemaic cosmology was translated in the ninth century, it is only during the eleventh century that such concentric models of the representation of celestial spheres become widespread (see examples in Chapter 2.3.1).[94] In later mystical writings (twelfth-thirteenth centuries), the celestial-spheres diagrams are appropriated to include the Arabic letters within the cosmological framework. While Neoplatonic emanationism and astrological components of the *Rasā'il* are heavily embedded within the mystical literature, there is a shift in the conception of the metaphysical; that is, the soul achieves salvation through the celestial world in the *Rasā'il*, whereas in the mystical writings, salvation is primarily through God, with the

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[92] For the interrelationship between the occult world of alchemy and medicine, see Owsei Temkin, "Medicine and Graeco-Arabic Alchemy," *Bulletin of the History of Medicine* (1955): 134–53.

[93] For an explication of the cosmological models of the Ikhwan, see also Ian Richard Netton, *Muslim Neoplatonists: An Introduction to the Thought of the Brethren of Purity (Ikhwān Al-Ṣafā')* (Abingdon: Routledge, 2013).

[94] Karamustafa, "Cosmological Diagrams," 75, n.12.

celestial world serving as an intermediary realm.[95] Ibn ‘Arabi, writing on theology and philosophy, visualizes the relationship between the geocentric cosmos and the metaphysical world as a set of concentric circles, (table 3, no. 32). [96] Al-Buni provides a more practical element in his writings, equipping his readers with some agency in harnessing the cosmic power. [97] In his treatises, the diagrams in concentric circles are generally labelled, *dā’ira* and *shakl*, suggesting that the word *shakl* may be used to label a geometric shape, or may be synonymous with a circular shape (table 3, nos. 33–5). This visual play of script and geometry in the mystical treatises suggests a deeper meaning. Given that letters and names are not merely epistemological, but rather ontological categories, the use of script to create the diagrams is a visual testament of creation or manipulation of the world using Arabic letters. Taking a few examples, this section demonstrates that the spiral design and concentric circles visualize and contribute to magical efficacy. Whether in the form of a labyrinthine demon trap as the Late Antique materials illustrate, or in the form of concentric circles that imitate the celestial world in medieval mystical tracts, the circular pattern was an active image. In other words, the image was doing something: trapping and containing demons or moving in circular trajectories to create and sustain the world.

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[95] Liana Saif, “From *Ghāyat al-Ḥakīm* to *Shams al-Maʿārif*: Ways of Knowing and Paths of Power in Medieval Islam,” *Arabica*, no. 64 (2017): 313.

[96] Karamustafa, “Cosmological Diagrams,” 83, and n.29.

[97] See Noah Gardiner, “Stars and Saints: The Esotericist Astrology of the Sufi Occultist Aḥmad al-Būnī,” *Magic, Ritual, and Witchcraft* 12, no. 1 (2017): 51–3.

4.5 Spokes/Radial Lines

Radial lines emanating from the circle's center can divide the circular form into a number of sectors. The number of divisional spaces produced using this method is potentially infinite, allowing for this visual tool to be fairly versatile. From the last section, one might notice in some examples that this device has often been used in conjunction with concentric circles (table 3, nos. 34 and 35). Nevertheless, the pattern of spokes has been employed independently as well, functioning through its aesthetic appeal as well as creating divisional markers within a singular entity. The Mesopotamian incantation bowls have made extensive use of this visual tool where script is composed along radial lines (table 3, no. 36). Through the recurrent use of radial-line images in magical materials over time, one might be able to trace an evolution of the pattern from Late Antiquity into the medieval period. In early Christianity the symbol of the christogram, chi-rho, appears in coins, rings, pendants, and architectural fragments, serving simultaneously to Christianize the Roman rulers and as a marker for divine guidance and protection.[98] The symbols of the chi-rho are the Greek letters X and P, denoting the name of Christ. The arrangement of these letters, the latter superimposed on the former, illustrates an image with a center point and six radial lines. When engraved in a signet-ring or a gemstone that is circular in form, the visual is identical to the pattern of spokes inside a circle. Ildar Garipzanov argues that the origins of the chi-rho may be attributed to Late Antique magical seals as seen in the *Books of Jeu*[99] — the Greek gnostic text from the third or

[98] For the range of materials, see Ildar Garipzanov, *Graphic Signs of Authority in Late Antiquity and the Early Middle Ages, 300-900* (Oxford: Oxford University Press, 2018). For rings and gems with the chi-rho, see Jeffrey Spier, *Late Antique and Early Christian Gems* (Wiesbaden: Reichert Verlag, 2007), 30–4.

[99] Garipzanov, *Graphic*, 35–41.

fourth century preserved in the Bruce Codex.[100] He demonstrates that the chi-rho is embedded with elements of power, divinity, and apotropaia as it builds on the visual repertoire of the magical text. In the context of Late Antiquity, the use of chi-rho as apotropaia was not only acceptable, but well placed within the cultural context where apotropaic graphic devices had become "a symptomatic feature."[101] A particularly striking example is the reliquary pendant of the Roman empress Maria (r. 398–407), from the Musee du Louvre OA.9523, which visualizes the chi-rho using letters rather than geometric lines (table 3, no. 37).

The gnostic/magical use of the visual tool — as seen in the *Books of Jeu*[102] — translates into a more accepted and widespread symbol, one that was deemed legitimate in Christian circles as it incorporated the name of Christ (the chi-rho among other variations). Already in the *Books of Jeu*, letters of the Greek alphabet were inserted into the diagrams, particularly the letters alpha and omega. These letters held symbolic significance representing God (Revelations 1.8 and 21.6) and Christ's divine nature (Revelations 22.13): "I am the Alpha and the Omega, the first and the last, the beginning and the end."[103] Such language to represent God and the use of letters as symbolic of God finds parallels not only in Islamic mystical cosmologies as discussed above, but very

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[100] Oxford, Bodleian Library, Ms. Bruce 96. See also Erin Evans, "Diagrams in the Books of Jeu," in *The Books of Jeu and the Pistis Sophia as Handbooks to Eternity* (Leiden: Brill, 2015), 73–94.

[101] Garipzanov, *Graphic*, 47.

[102] The spoke-like diagrams of the *Books of Jeu* are also redolent of other magical devices such as the use of *charaktêres* seen in Greek Magical Papyri and the Geniza fragments. See Richard Gordon, "Charaktêres between Antiquity and Renaissance: Transmission and Reinvention," in *Les saviors magique et transmission de l'Antiquité à la Renaissance*, ed. Véronique Dasen and Jean-Michel Spieser (Florenz: Micrologus, 2014), 255–300.

[103] Garipzanov, *Graphic*, 39.

much forms part of the Qur'anic repertoire abundant in Islamic magical materials. These include Qur'anic verses emphasizing the oneness and infinite nature of God (Q 112) and those summoning God's mercy and protection (Q 1). Such verses oftentimes appear in amulets as a series of spokes that emulate the gnostic and Christian patterns under discussion. They are particularly apparent in everyday objects rather than precious gems (table 3, no. 38). In addition to the amuletic association of the radial spokes, the pattern is also prevalent in esoteric treatises. In manuscripts attributed to al-Buni, radial designs are formed using the phrase *bismillāh al-raḥmān al-raḥīm* (In the name of God, the Most Compassionate, the Most Merciful). In one of the earliest dated treatises of the *Shams al-ma'ārif* (1201–1300), the diagram is labelled as a *dā'ira* (table 3, no. 39 and 40; fig. 4.5).

Radial lines are particularly prevalent in materials related to divination, as this mode of presentation is conducive to relaying a non-hierarchical host of options for its user. An elaborately inlaid geomantic device from the thirteenth century at the British Museum 1888,0526.1, features a series of nineteen identical radial constructions on a rectangular brass plate (table 3, no. 41; fig. 4.6).[104] Geomancy (*'ilm al-raml*) is a form of divination in which patterns of dots—traditionally created on the surface of sand or dust—were interpreted;[105] the device illustrating the popularity of the practice. A silver inlaid inscription on the device reads: "we have placed these arcs in order to generate the

[104] For a detailed description and working of the device, see Emilie Savage-Smith, "Islamic Geomancy and a Thirteenth-Century Divinatory Device: Another Look," in *Magic and Divination in Early Islam*, ed. Emilie Savage-Smith (Aldershot: Ashgate, 2004), 211–76.

[105] For more on geomancy, see Emilie Savage-Smith, "Geomancy," in *Encyclopaedia of Islam,* Third Edition, accessed October 19, 2021, http://dx.doi.org/10.1163/1573-3912_ei3_COM_27406. For geomancy in the Islamic world during the early modern period see Matthew Melvin-Koushki, "Astrology, Lettrism, Geomancy: The Occult-Scientific Methods of Post-Mongol Islamicate Imperialism," *The Medieval History Journal* 19, no. 1 (2016): 142–50.

figures (*ashkāl*) …" The technical term used for geomantic figures is *shakl* as illustrated in the device as well as textual sources.[106] The words employed for describing visuals are important in order to determine cultural associations. In this example, figure (*shakl*) implies geomantic figures, and the craftsman need not specify that the figures (*shakl*) in question relate to divination and geomancy, as it is apparent from the context. The circular constructions on the geomantic device find visual parallels with related metal objects such as astrolabes, as both practices incorporate cosmological phenomena.[107] A more striking parallel in metalwork is from objects with combination locks (table 3, no. 42).[108] Al-Jazari (d. 1206), known for his treatise on mechanical devices, describes a lock setting identical to the casket: "It is four circles on a long rectangle and inside this circle is [another] circle. Between them are sixteen lines and between the lines are sixteen of the twenty-eight letters."[109] While the radial inscriptions on combination locks generally include single letters rather than a complete word, the element that unites the two objects (geomantic device and locks) is secrecy: that one must possess the right knowledge to be able to maneuver and navigate the mechanics—made deliberately evident through the circular diagrams. *Zā'irja*, a divinatory technique closely aligned with geomancy, employs a circular diagram of concentric circles with radial lines to feature celestial

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[106] Savage-Smith, "Islamic Geomancy," 238, n.66

[107] For history and workings of astrolabes see Emilie Savage-Smith, "Celestial Mapping," in *The History of Cartography*, Vol. 2: *Cartography in the Traditional Islamic and South Asian Societies*, ed. J.B. Harley and David Woodward (Chicago: The University of Chicago Press, 1992), 18–34.

[108] For additional examples, see Francis Maddison, "Al-Jazari's Combination Lock: Two Contemporary Examples," in *The Art of Syria and the Jazira, 1100-1250*, ed. Julian Raby (Oxford: Oxford University Press, 1985), 141–158.

[109] Ibn al-Razzaz al-Jazari, *The Book of Knowledge of Ingenious Mechanical Devices*, trans. and ed. Donald Hill (Dodrecht and Boston: Reidel, 1974), 199.

spheres and letters of the alphabet, among other astrological elements (see also Chapter 2).[110] Primarily through an exercise in letter magic, the practitioner predicts future events using this diagram as well as an associated table, both of which are illustrated in Ibn Khaldun's treatise (table 3, no. 43).[111] The author describes the image in detail: "the form of the *zā'irja* they use is a large circle that encloses other concentric circles … the lines dividing each section run to the center. They are called chords."[112] Like some of the other diagrams, the *zā'irja* employs both concentric circles and radial lines; it is the latter, however, that augments the merely cosmological diagram of concentric spheres, visually demarcating the divinatory content. The technique of spokes or radial lines is frequent in magical materials related to divination precisely because it provides a non-hierarchical means of division, one that can be traced back to Late Antique gnostic seals.

Conclusion

This chapter has illustrated a range of materials that incorporate circular figures in magical contexts. By examining materials from Late Antiquity and the medieval period, and spanning across faith communities, the discussion highlights the prevalence of circular compositions and their functionality in the magical process. Physically enclosing text and images was one of the primary functions of the geometric shape. Greek Magical Papyri, Mesopotamian incantation bowls, and medieval Islamic seals and amulets provide

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[110] Toufic Fahd and Anne Regourd, "Zā'irdja," in *Encyclopaedia of Islam*, Second Edition, accessed July 14, 2020, http://dx.doi.org /10.1163/1573-3912_islam_COM_1376. For a description and working of the *zā'irja*, see also Robert Irwin, *Ibn Khaldun: An Intellectual Biography* (Princeton and Oxford: Princeton University Press, 2018), 138–40.

[111] Ibn Khaldun, *The Muqaddimah*, vol. 3, inserts.

[112] Ibn Khaldun, *The Muqaddimah*, 239.

plentiful examples of such enclosures, often in conjunction with the use of script. However, such visual constructions operate in combination with, or are the result of, oral incantations, rituals, and physical circular movements. The inclusion of script, particularly the name/s of God, operates in an ontological capacity; that is, the name itself was deemed powerful, rather than used as a means to access the divine. This idea present in the magical context translates well into the realm of Islamicate occult sciences, where *'ilm al-ḥurūf*; (science of letters) proposes an identical ontological framework.

Talismanic and divinatory objects similarly display a predilection towards circular models, exhibited across the Mediterranean. In particular, the language and choice of words employed in such circular compositions might provide an indication of an object's magical quality. Words such as *mubārak*, *arwāḥ*, *tanfa'*, and *shakl* constitute a verbal assemblage prevalent in divinatory objects. In esoteric and mystical texts, another set of words appear: *marṭaba*, *shakl*, *dā'ira*. The significance of the circle as a means to visualize the metaphysical is also pervasive in Late Antique philosophy and mystical thought.

In addition to its function of enclosure, the circle is also visualized as spirals or a set of concentric entities. While spirals represent visual imprints of oral incantations, concentric circles build on cosmological depictions to explain esoteric and mystical principles. The diagrams range from explanatory materials to those that embody the divine, such as the meditative visual devices of al-Buni. Lastly, there is the presence of spokes or radial lines in amuletic and divinatory contexts. While functionally conducive to divinatory practices, this mode of representation finds parallels in Late Antique gnostic diagrams and magical characters.

Through an examination of a diverse range of materials, the circular shape emerges as a recurrent element signifying and embodying magical, divinatory, talismanic, esoteric, mystical, and metaphysical themes. The significance of the circular form is retained even when objects transition between religions and ideologies, as numerous examples in the chapter exhibit. Moreover, the geometric form is augmented through the use of script. When presented in a circular arrangement, the script does not easily lend itself to an easy identification of the meaning of the words, especially where the text begins and where it ends; that is, the texts do not reveal their meaning quickly. Therefore, even with the script, the eye perceives the shape first, and subsequently the words. The circle takes precedence over the text.

The last two chapters dealing with magic demonstrate that the shapes (quadrilateral; star shape; circle) play a role in magical efficacy. The shapes also have agency, in that they are employed to do something, such as physically enclosing the demons or symbolically capturing the night sky. When combined with script, especially protective and summoning phrases, or illocutionary acts, the potency of the arrangement increases significantly, as both elements (word and shape) are efficacious in themselves. This combination of shape and script provides the practitioners with a sense of control over elements that affect their personal well-being, especially in matters of health and fortune. Whether it is through the internment of demons and venomous creatures to avert misfortune, or the use of celestial representations to predict the future, the shape (and text) empowers the practitioners. The dissemination of magic (as defined in this dissertation) in the twelfth and thirteenth centuries and the role of the shape in the

magical process, provides an opportunity to rethink the meaning of the intricate geometric script patterns in the *Kitāb al-diryāq*.

Chapter 5 Portals to Heaven: Script Patterns in Architecture and Coins

Magical practices and visual vocabulary were an important component of the urban fabric of medieval cities in the Islamic world. Many of the visual elements and magical frameworks that were part of portable objects—the private and personal spheres of magic (Chapters 3 and 4)—find their counterpart in monumental art and coins (and related objects). Although similar frameworks, ontologies, and vocabularies of magic permeate across the two domains (of portable objects and monumental art), they have often been examined separately in scholarship.[1] Part of the reason for this scholarly trajectory is the textual sources that inform the study of magical practices in medieval cities. In addition to the extant architectural forms and decoration that comprise the corpus for study, textual sources relating to the topics of history, geography, and urban topography make specific mention of talismans (*ṭilsam*)[2] and other apotropaic elements within the medieval city.[3] Textual accounts from travel writers and pilgrimage guides

[1] Recent scholarship is attempting to bring together magical objects and magical texts, however architectural decoration is overlooked. See for instance Venetia Porter, Liana Saif, and Emilie Savage-Smith, "Medieval Islamic Amulets, Talismans, and Magic," in *A Companion to Islamic Art and Architecture*, ed. Finbarr Barry Flood and Gülru Necipoğlu (Hoboken, NJ: Wiley Blackwell, 2017), 533–42. For magic in urban spaces, see Julia Gonnella, "Columns and Hieroglyphs: Magic 'Spolia' in Medieval Islamic Architecture of Northern Syria," *Muqarnas* 27 (2010): 103–20; and Finbarr Barry Flood, "Image against Nature: Spolia as Apotropaia in Byzantium and the Dar al-Islam," in Mapping the Gaze – Vision and Visuality in Classical Arab Civilisation, a special issue of *The Medieval History Journal* 9, no.1 (2006): 143–66.

[2] While talisman is defined as an object that harnesses celestial powers (see Chapter 4), medieval Arabic sources mentioned below have used the term to denote generally apotropaic images in the city that may or may not be dependent on astral powers. For a range of meanings for *ṭilsam*, see also Edward William Lane and Stanley Lane-Poole, *An Arabic-English Lexicon* (Beirut: Librairie du Liban, 1980), 1867.

[3] For urban topography of Greater Syria and Jazira, see Ibn Shaddad, *al-Aʿlāq al-khaṭīra fī dhikr umarā' al-Shām wa'l-Jazīra*, ed. Dominique Sourdel (Damascus: Institut Français de Damas, 1953); for geography, see the tenth-century Palestinian geographer, Muhammad ibn Ahmad al-Muqaddasi, *Kitāb aḥsan al-taqāsīm fī maʿrifat al-aqālīm*, ed. M.J. de Goeje, Bibliotheca Geographorum Arabicorum, vol. 3 (Brill: Leiden, 1967). For specific examples from the sources, see Flood, "Image," 143–66; and Gonnella, "Columns," 103–20.

also discuss sites of healing, miracles, and wonders—sometimes referred to as *'ajā'ib*—within the cityscape, corroborating the significance of the magical experience as part of urban life (for a discussion on *'ajā'ib*, see Chapter 6; for definitions, see also Glossary).[4] Both material culture and textual sources tell us that there are at least three elements that can be generally associated with magical efficacy within the urban environment: connection to antiquity; script (usually foreign or archaic); and animal imagery, especially snakes, scorpions, and lions.[5]

Part of the reason for the scholarly separation of public spaces and portable objects related to magic is that monuments and numismatics—circulating in the urban environment—also have non-magical functions. This is not to say that their magical role was secondary; rather, that magical ideas proliferate and intersect with matters of pilgrimage and devotion, or that city gates and fortifications were sites of security from physical and supernatural forces—imbrications also observed in the preceding chapters. The fact that both architecture and numismatics were suffused with magical elements also validates the medieval worldview of the interconnected universe, one that is at the core of the diagrammatic materials in scientific manuscripts, metaphysical thought, and the esoteric sciences (see Chapter 2–4). This chapter looks at the ways in which the geometric arrangement of text created meanings and shaped viewer responses, especially

[4] For writings on pilgrimage sites in the medieval period, see al-Harawi, *Kitāb al-Ishārāt ilā ma'rifat al-ziyārāt*, ed. Janine Sourdel-Thomine (Damascus: Institut Français de Damas, 1953); for travel writing, see the works of the eleventh-century Persian traveler, Nasir Khusraw: *Nāṣer-e Khosraw's Book of Travels: Safarnáma,* trans. W.M. Thackston (Albany: Bibliotheca Persica, 1986). For a discussion of additional sources related to pilgrimage and saint veneration, see Josef Meri, *The Cult of Saints among Muslims and Jews in Medieval Syria* (Oxford: Oxford University Press, 2002), 143–66.

[5] Josef Meri outlines five more categories related to talismans in the medieval Islamic urban context: footprints of the Prophet Muhammad, sacred rocks, pillars associated with saints, idols and statues, and paintings and mythical figures for their healing properties. See Meri, *The Cult*, 205.

in spaces and objects that were associated with some form of supernatural engagement. The discussion examines the three shapes explored in previous chapters (quadrilateral; circle; star) through different case studies relating to monumental art and numismatics between the eleventh and twelfth centuries in the Islamic world; however, they are geographically diverse, ranging from the Jazira, eastern Iran, and Egypt. The case studies demonstrate that script patterns are being employed in different parts of the Islamic world during this time, not only for their verbal meanings but also for the extra-linguistic messages that they convey.[6] In all of the cases, I argue that the script patterns serve as a gateway to knowledge beyond the confines of the terrestrial world.

5.1 Quadrilateral Enclosures in Funerary Inscriptions

The use of quadrilateral framing device is ubiquitous in Late Antiquity, and particularly in the regions of the eastern Mediterranean, taking the form of *tabula ansata*—a modern term denoting a rectangular plaque flanked by two triangles.[7] The *tabulae* generally enclosed only text—rather than figural images—and were common as votive devices.[8] Between the second and the sixth centuries, the *tabulae* proliferated, appearing in floors and walls of early Byzantine monuments and were commonly associated with dedicatory and funerary inscriptions, invocations, biblical quotations, and prayers. In the eyes of the

[6] For non-verbal meanings of monumental epigraphy in Islamic contexts, see Jamal Elias, *Aisha's Cushion: Religious Art, Perception, and Practice in Islam* (Cambridge: Harvard University Press, 2012), 236–83.

[7] For a brief history and overview of the *tabula ansata* in Late Antiquity see Sean Leatherbury, "Framing Late Antique Texts as Monuments: The Tabula Ansata between Sculpture and Mosaic," in *The Materiality of Text: Placements, Presences and Perceptions of Inscribed Text in Classical Antiquity*, eds. Andrej Petrovic, Ivana Petrovic, and Edmund V. Thomas (Leiden: Brill, 2019), 380–404.

[8] Leatherbury, "Framing Late Antique," 381–3.

Late Antique artists and viewers, the tabulae acted as commemorative markers, often due to their monumentality in churches and synagogues.[9] They signalled something important and something worthy of attention. For instance, a painted *tabula* from the eighth century in the Church of the Aedicula at Umm al-Rasas in present-day Jordan features Psalms 33 (34): 6, monumentalizing a biblical verse.[10] The Late Antique tradition continues into the early Islamic period, as illustrated in a *tabula ansata* at the Qusayr ʻAmra—a bathhouse—in Jordan which carries a dedicatory inscription to the Umayyad crown prince al-Walid ibn Yazid (r. 743–4).[11] In Late Antiquity, the *tabulae* were also carved in Roman tombs, carrying messages of protection. The third-century epitaph of Sertoria Festa in Lyon, located by the church of St Irenaeus, includes two inscriptions carved in the triangular sections of the *tabula*: "may you go safely" and "may you return safely."[12] Within the Christian context of the epitaph, the prayers offered piety, blessings, salvation for the dead and their resurrection—the shape of the frame alerting the viewers to the importance of the message. According to Edmund Thomas, the form of the *tabula* also referenced the cross or a double-headed axe, both of which contributed to the integration of a magical worldview as part of the religious sphere.[13] The three examples illustrate

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[9] See also Sean Leatherbury, "Framing Texts, Framing Beliefs," in *Inscribing Faith in Late Antiquity: Between Reading and Seeing* (New York: Routledge, 2020), 93–110.

[10] The inscription reads: "Those who look towards him are radiant, and their faces are never covered with shame." See Leatherbury, "Framing Texts," n. 103. For a discussion of the churches in Umm al-Rasas, see Michele Piccirillo and Eugenio Alliata, *Umm al-Rasas Mayfa'ah I: Gli scavi del complesso di Santo Stefano* (Jerusalem: Studium Biblicum Franciscacanum, 1994).

[11] The inscription is still fragmentary. See Garth Fowden, *Qusayr ʿAmra: Art and the Umayyad Elite in Late Antique Syria* (Berkeley: University of California Press, 2004), 178, 190–1.

[12] For *tabula* on Roman funerary architecture, see Edmund Thomas, *Monumentality and the Roman Empire: Architecture in the Antonine Age* (Oxford: Oxford University Press, 2008), 192–4.

[13] Thomas, *Monumentality*, 193.

that the image of the *tabula ansata* was versatile and widespread, across the eastern and western regions of Late Antiquity and into the Islamic period. The *tabula ansata*, while becoming popular for monumentalizing knowledge in Roman times, also retains its significance as a votive image, as a symbol of funerary dedications, and as a boundary for protection.[14]

While the *tabula ansata* image does not persist in Islamic period monuments, the rectangular framing of inscriptions is widespread and continues to evoke a sense of monumentality and significance.[15] The framing is considerably pronounced in funerary architecture that employs Arabic text to demarcate the enclosure. Burial practices in Islam integrate numerous local traditions, including the reuse of past materials, within the funereal environment. For instance, in her study of burial graves in Homs, Syria, Jennie Bradbury highlights pre-Islamic visual motifs, materials, and local cultural traditions as meaningful additions for Muslims.[16] Funerary architecture was, therefore, not limited to primarily religious practices.[17] Numerous examples related to funerary architecture in medieval Islam feature text and images connected with supernatural protection in the afterlife—both within and outside the remit of religion, as the examples below will

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[14] Leatherbury, "Framing Late Antique," 385–9.

[15] The image of the *tabula ansata* is prevalent as chapter headings in Qur'anic manuscripts, however. For the *tabula ansata* and its variations in the Islamic world, see Ernst Herzfeld, "Die Tabula ansata in der islamischen Epigraphik und Ornamentik," *Der Islam* 6 (1916): 189–99.

[16] Jennie Bradbury, "'Presencing the Past': A Case Study of Islamic Rural Burial Practices from the Homs Region, Syria," in *Landscapes of the Islamic World*, ed. Stephen McPhillips and Paul D. Wordsworth (Pennsylvania: University of Pennsylvania Press, 2016), 200–18.

[17] For Islamic burial practices as integrating local traditions, see also Marcus Milwright, *An Introduction to Islamic Archaeology* (Edinburgh: Edinburgh University Press, 2010), 131–5. For an overview of funerary architecture and burial practices in Islam, see D. Fairchild Ruggles, "Cemeteries and Funerary Architecture," in *Encyclopaedia of Islam*, Third Edition, accessed November 14, 2021, http://dx.doi.org/10.1163/1573-3912_ei3_COM_24613.

demonstrate. Within this context is the quadrilateral text frame, evoking the Late Antique heritage of framing as a form of communication, monumentalization, and magical belief. The remainder of this section will illustrate some examples from medieval Iran and Jazira featuring rectangular arrangements of text—highlighting also that identical visual patterns travelled across distances.

From the region of Siraf in Greater Iran, excavations reveal cenotaphs—hollow covers signifying the body buried in the ground—profusely illustrated with script.[18] A stone cover dated to 383 AH/993 AD, currently *in situ*, incorporates angular Kufic characters in an elongated rectangular shape to mark the rim on the top panel of the cover (table 4, no. 1). Carved in low relief and measuring 1.51 x 0.34 x 0.50 m, the fragmentary inscription offers blessings to the deceased, Ibrahim b. ʻAli.[19] The side faces of the cenotaph use a larger script size carved in floriated and plaited Kufic characters to present verses from the Qur'an—one of the earliest examples of interlace writing.[20] The example illustrates that the stylization of the letters is reserved for Qur'anic verses, honoring, beautifying, and monumentalizing the word of God; while the embellishment would have made the text challenging to read, the Qur'anic text is one that many viewers would have

[18] See David Whitehouse, "Excavations at Sīrāf: Second Interim Report," *Iran* 7 (1969): 39–62; David Whitehouse, "Excavations at Sīrāf: Fourth Interim Report," *Iran* 9 (1971): 1–17; and Nicholas Lowick, *Siraf XV: The Coins and Monumental Inscriptions* (London: British Institute of Persian Studies, 1985). For an overview of cenotaphs in the Islamic world, see also Sheila Blair, "Cenotaph," in *Encyclopaedia of Islam*, Third Edition, accessed November 14, 2021, http://dx.doi.org/10.1163/1573-3912_ei3_COM_24386.

[19] The inscription reads: "In the name of God, the Merciful, the Compassionate: Ibrahim b. Ali … died in Jumada II of the year three (hundred) and eighty three … O God, blessings on Muhammad and the family of Muhammad: the power belongs to God." Whitehouse, "Excavations at Sīrāf: Fourth," 17.

[20] For interlace writing, see also Sheila Blair, "Legibility versus Decoration in Islamic Epigraphy: The Case of Interlacing" in *World Art: Themes of Unity in* Diversity, ed. Irving Lavin (University Park: The Pennsylvania State University Press, 1989), 329–334; for interlace on ceramics, see Lisa Volov, "Plaited Kufic on Samanid Epigraphic Pottery," *Ars Orientalis* 6 (1966): 107–33.

easily deciphered.[21] By contrast, a simpler style is employed for the cover, clearly marking the name—yet the monumentality is retained through its quadratic arrangement. Identical arrangements of grave covers—blessings and names in rectangular frames and Qur'anic verses in interlace script—attest to the prevalence and continuation of this practice, where framing script on stone and wood covers would have likely signaled an eschatological association.[22] Several elements of the grave cover find resonance with the Greco-Egyptian and Islamic block-printed amulets discussed in Chapters 3 and 4. First, the rectangular arrangement is personalized, offering a sense of continuous blessings and protection for the deceased. Second, the quadratic shape and the individual name are bound together, a visual trope ubiquitous in the amuletic tradition. Third, the rectangular inscription emulates the rectangular shape of the grave, the frame forming a physical enclosure of everlasting protection for the body. The style of the Kufic script in the Siraf grave covers is also notable for its similarities with the calligraphic pages of the *Kitāb al-diryāq*; the foliation of the letters, on the other hand, exhibits affinities with the Mosque of al-Hakim (990–1013) in Fatimid Cairo. The style of script and the geometric arrangement of text demonstrates that both style and pattern—and perhaps meanings—transcend geographic boundaries in the medieval Islamic world.

Intricately carved wooden cenotaphs retain the quadratic framing on its panels, such as the twelfth-century example from Iran at the Royal Ontario Museum, Toronto, belonging to a Shi'i patron (table 4, no. 2). Kufic script with elongated vertical stems

[21] For reading and writing practices, see Konrad Hirschler, *The Written Word in the Medieval Arabic Lands. A Social and Cultural History of Reading Practices* (Edinburgh: Edinburgh University Press, 2012), 16–30.

[22] See the examples in Whitehouse, "Excavations at Sīrāf: Second."

encircles a vegetal pattern on the upper lid of the cover, carrying the name of the maker in this case, Muhammad b. Ahmad. This rectangular arrangement is flanked by two additional rectangular frames, both of which enclose text. The two end registers carry an incomplete verse of the Qur'an (2:255), commonly known as the *Ayat al-Kursī* (Verse of the Throne), and the enclosed text features a Prophetic saying: "Yourselves are the friends of Hell." The four sides of the cenotaph also employ a series of rectangular frames with inscriptions from the Qur'an, the names of six Shi'i Imams, and sayings of the Prophet.[23] Instead of the name of deceased as seen in the previous example—which is absent from this cenotaph—the lid cover has the name of the maker, who becomes permanently bound within this charged visual repertoire. His name is also mentioned another time, on one of the long-edge panels: "the servant, in need of (the mercy of God), Muhammad [i]bn Ahmad, may (God) forgive his sins."[24] The grave cover is not only an artistic triumph that monumentalizes the deceased—and the maker; rather, the inscriptions are equally a conduit for seeking protection in the afterlife for the dead, and in this life for the living. In addition, the monumentalization of the word of God and of persons of religious significance in this manner invites public attention for the sake of bestowing blessings for those in the vicinity of the object. Particularly in Shi'i contexts, tombs and cenotaphs are also generally associated with a ritual of circumambulation, thus allowing the designs and images to be fully appreciated and imbibed by the viewer (see

[23] The verses of the Qur'an include: 1:1–7; 74:37; 3:182; 21:36; 29:57. A translation of the inscriptions can be found at: "Tomb or grave cover (cenotaph) with Shi'i inscriptions," Royal Ontario Museum, accessed November 2, 2021, https://collections.rom.on.ca/objects/462173/tomb-or-grave-cover-cenotaph-with-shii-inscriptions.

[24] For a detailed reading of the inscriptions, see Sheila Canby, Deniz Beyazit, Martina Rugiadi, A. C. S. Peacock, eds., *Court and Cosmos: The Great Age of the Seljuqs* (New York: Metropolitan Museum of Art, 2016), 294–5.

also Section 5.4). The quadratic inscriptions, thus, become a monumental counterpart to the amuletic designs that proliferated amongst people as seen in Chapter 3.

Thus far, the examples illustrate that the quadrilateral frame surrounded images or text that were held in high regard by the medieval viewer, such as pious names, and even the physical body. In eleventh- and twelfth-century tombstones from Iran, quadratic-script patterns enclose another charged motif: the niche. In the marble tombstone of Abu Bakr b. Ibrahim at the Los Angeles County Museum of Art, dated 495 AH/1101–2 AD (M.71.73.34; height: 48 cm; table 4, no. 3 and fig. 5.1), Kufic script encircles a rectangular geometric frame, carrying an apotropaic verse from the Qur'an (3:18) on three sides—one common in amulets, such as seen in a small paper amulet from eleventh-century Egypt at the Aga Khan Museum (AKM 508).[25] The base of the frame carries the name of the craftsman, Umar b. 'Ali. While all four sides employ an identical script style, the base script diverges from the rest through its upright placement. By not being inverted to complete the quadratic trajectory, the bottom edge of the quadratic frame enforces legibility and marks the significance of the craftsman's signature for the public. Visibility is reinforced by script size, the outer frame carved in larger and more legible characters than the innermost script that contains the name of the deceased. In doing so, however, the praxis of monumentalization from Late Antiquity is kept alive through quadratic frames. A second, nested frame, comprising of only three registers, circumscribes the central niche. This second frame carries *Sūrat al-Ikhlāṣ* (Q112: 1–4), a

[25] "Printed Amulet with Box," Aga Khan Museum, accessed November 4, 2021, https://www.agakhanmuseum.org/collection/artifact/printed-amulet-with-box-akm508. The verse is translated as: "God bears witness that there is no god but Him, as do the angels and those who have knowledge. He upholds justice. There is no god but Him with the power to decide." M.A.S Abdel Haleem, transl., *The Qur'an* (New York: Oxford University Press, 2005), 35.

verse copiously featured in magical contexts especially in geometric configurations (see Chapters 3 and 4). The innermost element of this tombstone is the niche motif represented through a pointed arch surmounting a pair of columns and capitals. This so-called "mihrab image" was ubiquitous in funerary architecture from Iran as well as in the Jazira.[26] Mihrab often refers to the three-dimensional niche in a mosque space to indicate the direction for prayer, the qibla. In Muslim burial practices, the body was generally aligned towards the qibla. Furthermore, the dead were regarded as intercessors between the living beings and God with prayers were directed towards them, hence the presence of a mihrab.[27] Pre-Islamic literary and material sources corroborate associations of death and the afterlife with the word "mihrab" and its visual prototype of an architectural portal.[28] The image of the niche as a doorway, particularly when inscribed with the name of the deceased, acts as a liminal space between this world and the next. As such, the image fulfills the role of safeguarding the souls. The series of inscriptions framing this motif augment the protective role of the mihrab image, further sealing the portal from any ill will. The quadratic frames on the tombstone, engraved in this manner, suggest it functioned in a similar way as those of the magical amulets, serving as a protective barrier from the negative forces and as a portal for continuous *baraka*.

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[26] Other examples from Iran include MMA 33.118 (dated 1150); Seattle Art Museum 44.68 (dated 1143); Harvard Art Museums 1963.18 (dated 1117). From the Jazira, see David Collection Inv. 28/2001 (c. 12th C).

[27] Ruggles, "Cemeteries."

[28] Geza Fehérvári, "Tombstone or Mihrab? A Speculation," in *Islamic Art in the Metropolitan Museum of Art*, ed. Richard Ettinghausen (New York: Metropolitan Museum of Art, 1972), 250–2; also see Geza Fehérvári, "Miḥrāb," in *Encyclopaedia of Islam,* Second Edition, accessed October 8, 2020, http://dx.doi.org/10.1163/1573-3912_islam_COM_0733.

The enclosure provided by the quadrilateral framing script is also mirrored in a thirteenth-century ceramic tile, that can be attributed to Iran or Syria. Housed at the Harvard Art Museums (1955.89), the tile is from a mausoleum setting and employs a mihrab image framed using *Sūrat al-Ikhlāṣ* (Q112; table 4, no. 4). While the framing occurs only on three of the four sides, the effect is very similar to a full frame. The tile offers no indication of its use as a tombstone (such as the inclusion of the word *qabr*), nor as being a qibla marker. However, the presence of framing script and the placement of *Sūrat al-Ikhlāṣ* in this manner suggests an alternative interpretation: an apotropaic fragment. Medieval sources contain the terms *ṣūrat miḥrāb* (mihrab image) and *shakl miḥrāb* (mihrab form) to distinguish between the flat mihrabs — to which the two terms refer — and their three-dimensional counterparts in mosque settings.[29] Both *ṣūra* and *shakl* are predominant in magical contexts, and it may be worthwhile to consider its application in the context of the visual mihrab device. While the predominant interpretation of the mihrab visual is its association with the light verse from the Qur'an (Q24: 35), the use of apotropaic verses common in magical materials in tandem with the mihrab image suggests that this multivalent image offers more than one mode of reception.[30] There are several examples that illustrate the apotropaic significance of the mihrab image even without the layer of the quadratic frame. For instance, a tombstone from Greater Syria uses a semi-circular arch to represent the Qur'anic verse (Q112); a tile panel from the Jazira uses the architectonic image to enclose part of Q112 as well as

[29] Nuha Khoury, "The Mihrab Image: Commemorative Themes in Medieval Islamic Architecture," *Muqarnas* 9 (1992): 12. Author cites references to Ibn Battuta, Khoury, n.8.

[30] For the many interpretations associated with the image of a lamp in a niche, see Margaret Graves, "The Lamp of Paradox," *Word & Image* 34, no. 3 (2018): 237–50; and Stephennie Mulder, "Seeing the Light: Enacting the Divine at Three Medieval Syrian Shrines," in *Envisioning Islamic Art and Architecture*, ed. David Roxburgh (Leiden: Brill, 2014), 88–108.

another apotropaic verse: “so God will guard you against them ...” (Q2:137) (table 4, no. 5). Such examples of flat mihrabs appear in funerary materials, mausoleums, shrines, and devotional spaces.[31]

The multivalent visual device also functions as a symbol of commemoration, such as the one in the mausoleum of Shaykh Fatih in Mosul (table 4, no. 6; and fig. 5.2). [32] The commemorative aspect is highlighted through the name of its patron, Lady Jum‘a. The central arch is framed on all four sides in floriated Kufic script, and inscribed with Q112 on one side and Q10:46 on its reverse.[33] The quadratic framing of the arch in this manner signals that viewers may have interacted with this object as more than just the commemoration of its patron. The mihrab image encloses the word “Allah” on its apex, with the remainder containing names of Muhammad, Abu Bakr, ‘Umar, ‘Uthman, and ‘Ali—the latter four being names of caliphs that succeeded Muhammad—in star-shaped enclosures. The architectural portal as a liminal space is being exploited, wherein the names of the Prophet and his Companions are intended to increase the blessings onto its patron and the viewer; the framing inscription enclosing the sacred. Another architectural object with quadratic-script framing adds to the discussion on visuality and viewer engagement: a wooden minbar fragment from Yazd at the Metropolitan Museum of Art (MMA 34.150.1). The object containing rectangular framing device carries a Qur’anic text colored in red, yellow, and indigo pigments (table 4, no. 7). The accentuation of the

[31] For more examples of quadrilateral text in funerary settings in fourteenth-century Iran, see also Sheila Blair, “Art as Text: The Lustre Mihrab in the Doris Duke Foundation for Islamic Art,” in *No Tapping around Philology: A Festschrift in Honor of Wheeler McIntosh Thackston Jr.’s 70th Birthday*, ed. Alireza Korangy, Daniel J. Sheffield (Wiesbaden: Harrassowitz Verlag, 2014): 407–36.

[32] For mihrab images as commemorative see Khoury, “The Mihrab Image,” 11–28.

[33] Khoury, “The Mihrab Image,” 16.

framing with pigments as a tool for visual engagement is highlighted by the selection of Qur'anic verses that emphasizes one's responsibility to look carefully and closely: "… Look again! Can you see any cracks? Look again! And again! Your sight will turn back to you, weak and defeated. We have adorned the lowest heaven with lamps, and made them [missiles] for stoning devils" (Q67: 3–5).[34] The Qur'anic verse is in reference to the perfection in God's creation, making specific reference to the eradication of demons, especially in conjunction with lamps. The repetitive references to sight invite a closer appreciation—perhaps even a contemplation—of framing script patterns. The examples in this section illustrate that the quadratic script frame generally carries either names or protective phrases that together bind and protect, visually amplifying information. The frames were employed to monumentalize and attract viewer attention—but they were also charged images that were embedded with agency on a supernatural level.

5.2 Contemplating the Divine through Circular Frames

The combination of inscription and circles, that is, either script enclosed within a circle, or script in circular forms, is characteristic of Late Antique architectural decoration. The device is a continuation of classical Roman practices of using a "medallion" and "roundels" to visualize authority, achievements, and recognition.[35] An adaption of this visual form became pervasive in Late Antique churches and synagogues, where the shield-frame and the wreath-frame circumscribed names and images of saints, as well as

[34] Q67: 3–5. Haleem, transl., *The Qur'an*, 382.

[35] For the use of "medallion" and its features in Byzantine art, see James Trilling, *The Medallion Style: A Study in the Origins of Byzantine taste* (New York: Garland Pub, 1985).

dedicatory inscriptions.[36] For instance, the ceiling of the Dura Europos, a third-century synagogue in Syria known for its paintings of biblical narratives, includes inscribed bricks in black- and red-painted wreaths to portray the names of donors in Greek script—memorializing their names in the Roman fashion within the sacred space.[37]

In the eastern Mediterranean context, dedication inscriptions are combined with prayers, especially in the few examples where the text itself is arranged into a circular frame.[38] Located in church pavements from present-day Jordan, the circular inscriptions generally summon God or invoke blessings for its patrons and makers—an embodiment of the sacred or apotropaia.[39] For instance, located on the floor of the nave in the Church of Apostles in Madaba, dated to 578–9, a large medallion eulogizes the donors of the church through a circular inscription (table 4, no. 8).[40] Within this Christian context, the donors—and likely also the mosaicist—are bound together with the sacred prayer, the geometric shape enforcing a circular movement by the viewers as they engage in prayer.[41] This manner of inscriptions, where both patrons and the artist are monumentalized, resonates with later Islamic tombstones discussed above, where the

[36] Leatherbury, *Inscribing Faith*, 110–9.

[37] Karen Stern, "Mapping Devotion in Roman Dura Europos: A Reconsideration of the Synagogue Ceiling," *American Journal of Archaeology* (2010): 473–504.

[38] Encircling inscriptions of this kind are rare in walls and floors of monuments between the third and the seventh centuries. For encircling inscriptions in Late Antique architecture, see Marcus Milwright, *The Dome of the Rock and its Umayyad Mosaic Inscriptions* (Edinburgh: Edinburgh University Press, 2016), 179–89.

[39] For embedded prayers in Late Antique inscriptions, see Leatherbury, *Inscribing Faith*, 239–84.

[40] For the English translation, see table 4. For the Greek transcription, see Leatherbury, *Inscribing Faith*, 251, n. 62.

[41] For circular viewing in Christian contexts, see Leatherbury, *Inscribing Faith*, 148–55.

deceased and the craftsmen are primary recipients of blessings. In an encircling fashion, the *diakonikon* (preparatory clerical space) of the sixth-century Propylaea Church in Gerasa (modern-day Jarash) also carries a passage from the Psalms: 85(86): 1–3 (table 4, no. 9). The framing text includes a construction date and a prayer beseeching God: "guard my soul," and "have mercy on me, Lord."[42] The protective nature of the inscription is augmented by its circular rendition, as well as interlocking squares and guilloche borders, thereby solidifying the magical visual repertoire (see also 5.3 and Chapter 3 for polygonal shapes as magical). The round text frame further alludes to Late Antique philosophical and Christian notions of the universe (*kosmos*) and the soul as circular in form (see Chapter 4).[43] The examples of encircling inscriptions are all from regions in present-day Jordan, particularly on pavements, likely due to the presence of a mosaic workshop in the region.[44] However, the physical movement of bodies and script is also echoed in churches located in Constantinople, where inscriptions are located on the walls of the buildings above eye level. For instance, the ambitious epigraphic program of the sixth-century church of St. Polyeuktos, and the inscription on the interior entablature at Ss. Sergius and Bacchus, dated 527–536, both present a set of prayers for their patrons. The inscriptions are placed in a manner that follows the trajectory of the architectural enclosure. The inscriptions exalt their donors, the imperial princess, Anicia Juliana (462–

[42] For the complete translation, see Leatherbury, 249–50.

[43] The Greek word *kosmos* in some floor inscriptions has been translated as "decoration" but also "cosmos" and "order", thus alluding to a Christian cosmological reading of the circular frame. Leatherbury, *Inscribing Faith* 60, 154. For ritualized movement and orality associated with the non-linear reading of this text and related Byzantine monuments, see also Amy Papalexandrou, "Text in Context: Eloquent Monuments and the Byzantine Beholder," *Word and Image* 17:3 (2001): 259–83.

[44] Leatherbury, *Inscribing Faith*, 239.

567), and the Byzantine emperor and his wife, Justinian (r. 527–65) and Theodora (490–548), respectively, inviting the visitor to move in circles.[45] As part of the continuation of a Late Antique aesthetic, mosaic inscriptions in Arabic continue to encircle important Islamic architectural spaces such as the Dome of the Rock—facilitating imperial monumentality and symbolic protection.[46] The remainder of this section will briefly examine two cases from the medieval Islamic world that feature text in circular arrangements: a panel from the Mosque of Nur al-Din Zangi in Mosul and the Shah Fadl tomb in present-day Kyrgyzstan. Despite geographic distances, the examples illustrate the form of the circle paired with pious or Qur'anic verses as embodying the divine, the infinite, and hidden, as well as encouraging prolonged viewing and contemplation.

A set of epigraphic medallions feature on a tripartite panel made from intricately carved stucco on the qibla wall in the mosque of Nur al-Din Zangi in Mosul in present-day Iraq (fig. 5.3a–b; table 4, no. 10).[47] Situated between the mihrab and the dome, the panel is comprised of three sections: a taller central frieze flanked by near identical lateral structures (fig. 5.4). Surviving in a fragmentary form, the stucco carving on the panel also includes a series of niches, and columns, with compositions and ornamentation using the Arabic script. Set amidst scrolls of vegetation and geometric patterns, the script exhibits

[45] For a discussion of St. Polyeuktos, see Jonathan Bardill, "A New Temple for Byzantium: Anicia Juliana, King Solomon and the Gilded Ceiling in the Church of St Polyeuktos in Constantinople," in *Social and Political Life in Late Antiquity*, eds. William Bowden, Adam Gutteridge, and Carlos Machado (Leiden: Brill, 2006), 339–72; for Ss. Sergius and Bacchus, see Jonathan Bardill, "The Date, Dedication, and Design of Sts. Sergius and Bacchus in Constantinople," *Journal of Late Antiquity* 10 (2017): 62–130. See also n. 43 above.

[46] For a detailed analysis of the Dome of the Rock's mosaic inscriptions and its apotropaic significance, see Milwright, *The Dome of the Rock*, 172–213.

[47] For an account of the original mosque structure and subsequent additions, see Yasser Tabbaa, "Mosque of Nur al-Din in Mosul," *Annales Islamogiques* 36 (2002): 339–60.

extensive manipulation of its letterforms and ligatures, consciously crafted to generate discernable motifs. Three epigraphic circles are employed in this panel: a large circle on the left lateral side, and two smaller ones on the right, both of which are part of an architectural ensemble. On the left, a multilobed panel encloses the epigraphic medallion, set within a rectangular structure (fig. 5.4, mark-up 9 and fig. 5.3). The circular inscription survives only in a fragmentary state. The central word reads Allah. The word Muhammad is then rendered six times; each word occupies a quadrant-like pattern within the circle. The base of the letters and their ligatures are elongated to form the circumference of the circle, while the vertical extensions of the letter *ḥā'* form heart-shaped knotted motifs that decorate the central field of the circle. The letter *mīm* is arranged to form an inner ring of the circle, framing the word Allah through a six-pointed star. According to Tariq al-Janabi, who has conducted a survey of medieval Iraqi architecture, this is the first instance of a completely epigraphic medallion in northern Iraqi visual culture.[48] On the right side (fig. 5.4, mark-up 9, right), two roundels on the spandrel repeat the word Muhammad three times, carving the words in a similar, though not identical, design as the larger medallion.

Nur al-Din Mahmud ibn Zangi (r. 1146–1174), during his final years of reign over Mosul, commissioned the mosque of Nur al-Din (also known as the Great Mosque of al-Nuri). The mosque complex, constructed between 1170 and 1172, included a prayer space and a madrasa, and is renowned for its sixty-meter-tall ornamental brick minaret. Yasser Tabbaa suggests that the stucco panel was not contemporary to the construction of

[48] Tariq al-Janabi, *Studies in Medieval Iraqi Architecture* (Baghdad: Ministry of Culture and Information, State Organization of Antiquities and Heritage, 1982), 336.

the mosque (1170–72) but was likely added in the first half of the thirteenth century.[49] In the thirteenth century, the region of Mosul was governed by Badr al-Din Lu'lu' (r. 1232–1259; see Introduction for historical context). He was known for his tolerant and egalitarian rule with the Christians and the Shi'a, as well as between competing Sunni legal schools (*madhhab*s)—one with palpable effects in architecture and the decorative arts.[50] The monumental stucco panel in the mosque space exhibits numerous connections with apotropaia in Muslim and Christian contexts and an esoteric embodiment of the sacred as will be discussed below, suggesting its addition as reflective of the wider practices of Lu'lu' in Mosul.

First, the location of the panel is significant: it is placed directly above the mihrab on the qibla wall. As the wall indicates the direction of prayer, the stucco panel is strategically placed to invite the congregants' gaze. The panel is thus monumental and visible. As a whole, the panel resembles a mihrab: the niches, columns, calligraphy, ornamentation, and even its location is identical to a mihrab. However, the panel is not a mihrab. As discussed in the section 5.1 above, the mihrab image is versatile and has been incorporated in numerous settings and contexts, both inside and outside the mosque. Similar tripartite forms can be seen in the restored thirteenth-century Syriac orthodox monastery, the Mar Behnam, located just south of Mosul.[51] The monastery was also

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[49] Tabbaa, "Mosque," 350.

[50] Douglas Patton, *Badr Al-Din Lu'lu': Atabeg of Mosul, 1211-1259* (Seattle: University of Washington Press, 1991), 66–7. For more on Christians in Mosul, see Bas Snelders, *Identity and Christian-Muslim Interaction: Medieval Art of the Syrian Orthodox from the Mosul Area* (Leuven; Walpole, MA: Peeters, 2010).

[51] See Suha Rassam, "Der Mār Behnam: The Monastery of Saint Behnam" in *The Christian Heritage of Iraq: Collected Papers from the Christianity in Iraq*, ed. Erica Hunter (Piscataway, NJ: Gorgias Press, 2009), 81–91.

recognized as shrine for the legendary Muslim prophet, Khidr, known for his knowledge of the esoteric world.[52] Located on the exterior wall between the western doors of the monastery, a tripartite niche, the *bet ṣlotā*, marks the entrance to the prayer space (fig. 5.5).[53] Several other entrances within the Mar Behman monastery include visual vocabulary that indicates their apotropaic significance. For instance, one of the entrance portals is comprised of a series of niches formed using the bodies of serpents, intersecting with one another through the use of knots (see below for knotting and dragon bodies as protective symbols). Other gates include inscriptions such as: "whoever crosses thy threshold is in total safety," and "this gate is the gate of mercy and he who enters shall find mercy." The inscriptions reinforce the doors, gates, and thresholds as liminal sites, where protection may be sought.[54] The tripartite niche structure is also found in the mausoleum of the Panja 'Ali, located just outside Mosul, functioning as a mihrab in this setting (fig. 5.6). The alabaster mihrab contains an inscription dating it to 686 AH/1287 AD. The motif of a lamp situated in the central niche is illustrated as hanging from interweaving ropes; the interlaced element echoing the letterforms seen in the Nuri façade. The outermost inscription encircling the entire tripartite panel calls on the blessings of the Prophet Muhammad, 'Ali as the divinely-guided Imam, continuing with

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[52] For Khidr, see A.J. Wensinck, "al-Khaḍir," in the *Encyclopedia of Islam*, Second Edition, accessed November 1, 2021, http://dx.doi.org /10.1163/1573-3912_islam_COM_0483; and Françoise Aubaille-Sallenave, "Al-Khiḍr, 'L'homme au manteau vert' en pays musulmans: ses fonctions, ses caractéres, sa diffusion," *Res Orientales* 14 (2002): 11–36. For monuments associated with Khidr, see Ethel Sara Wolper, "Khiḍr and the Changing Frontiers of the Medieval World," *Medieval Encounters* 17 (2011): 120–46.

[53] For a detailed description of the architectural features and inscriptions, see Bas Snelders, "Appendix A: A Description of Deir Mar Behman," in *Identity*, 552–62.

[54] For the apotropaic significance of the gates of Mar Behnam, see Ethel Sara Wolper, "Khidr and the Politics of Translation in Mosul: Mar Behnam, St George and Khidr Ilyas," in *Sacred Precincts: The Religious Architecture of Non-Muslim Communities Across the World,* ed. Mohammad Gharipour and Mattia Guidetti (Leiden: Brill, 2014), 377–92.

the names of the twelve Shi‘ite Imams. The Shi‘ite affiliation of the space is embedded within its name Panja ‘Ali, literally meaning the hand of Ali. The Panja ‘Ali panel, with its inscriptions and visual imagery, serves as a visual manifestation of the sacred. Thus, in the eyes of medieval patrons, artists, and the congregation, the form of the Nuri stucco panel would have evoked the presence of a charged, sacred portal.

Although the Nuri panel is suffused with inscriptions, the manipulation of script into architectural motifs as well as the extensive knotting and interlacing of script suggests that the visual reception—rather than legibility—of the object was an important consideration in the design of the panel. Not only does the interlacing of script resonate with interlaced motifs in the apotropaic settings of the niche panels discussed above, the knotting styles of the script also resemble the knotted bodies of serpents and dragons that were prevalent in regions across the Jazira in the twelfth and thirteenth century.[55] In this period, dragons were often depicted as mirror images or in pairs, most commonly seen on thresholds, such as entrances, portals, doorways, and gates.[56] These areas were vulnerable places where demons and evil spirits could reside and needed to be protected. Dragons with knotted bodies were a common sight—also seen in the beginning of the *Kitāb al-diryāq* manuscript (Chapter 1). More specifically, the pretzel or heart-shaped knots created using elongated bodies of serpents are replicated using letter stems in the Nuri panel. The heart-shaped knots are characteristic features of serpent images in several monuments: in the thirteenth-century Talisman Gate in Baghdad; the entrance gate of the

[55] For the dragon and serpent motif in Jazira and the medieval eastern Mediterranean, see Sara Kuehn, *The Dragon in Medieval East Christian and Islamic Art* (Leiden: Brill, 2011), 159–68.

[56] See also Persis Berlekamp, “Symmetry, Sympathy, and Sensation: Talismanic Efficacy and Slippery Iconographies in Early Thirteenth-Century Iraq, Syria, and Anatolia,” *Representations* 133, no. 1 (2016): 76–81.

Citadel of Aleppo completed in 1213; and the gate of Badr al-din Lu'lu's caravanserai near Mosul (see fig. 5.7 for comparisons). The deliberate twisting of the serpentine bodies has further prompted scholars to interpret these materials as holding talismanic properties.[57] Michael Camille, in his discussion of magic in medieval Europe describes the knot as the "magical visual form par excellence."[58] The ancient practice of tying knots and blowing on them was a way of binding together magical and supernatural powers. The use of knots is seen as early as the Pharaonic period in Egypt in textual amulets made from papyrus and linen.[59] Knots can be witnessed in incantation bowls from Mesopotamia as well as seen in magic-medicinal bowls from the Jazira region (Chapters 3 and 4). They also appear in Late Antique church floors, often representing Solomon's knot (see Chapter 3 for the magical significance associated with Solomon).[60] Rituals of knot-blowing as indicative of magic have also been mentioned in the Qur'an.[61] The presence of knots was thus widely known and symbolic of healing, protection and supernatural powers. A fourteenth-century theologian goes so far as to define the Arabic word *ṭilsam* (talisman) as an "indissoluble knot."[62]

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[57] See n. 54 and 55 above.

[58] Michael Camille, "Visual Arts in the Two Manuscripts of the Ars Notoria," in *Conjuring Spirits: Texts and Traditions of Medieval Ritual Magic*, ed. Claire Fanger (University Park: Pennsylvania State University Press, 1998), 123.

[59] Jacco Dieleman, "The Materiality of Textual Amulets in Ancient Egypt," in *The Materiality of Magic*, ed. Dietrich Boschung and Jan Bremmer (Paderborn: Wilhelm Fink, 2015), 23–58.

[60] Kitzinger, "The Threshold," 244–59.

[61] Q113: 4 mentions "women who blow on knots." For a discussion of this verse and its magical context, see Travis Zadeh, "Magic, Marvel, and Miracle in Early Islamic Thought," in *The Cambridge History of Magic and Witchcraft in the West: From Antiquity to the Present*, ed. David J Collins (Cambridge: Cambridge University Press, 2015), 239–40.

[62] The Ottoman theologian and biographer, 'Isam al-Din Tashköprüzade mentioned this in his encyclopaedia, *Miftāḥ al-sa'āda wa-miṣbāh al-siyāda*, discussed in Kuehn, *The Dragon*, 161 and n. 31.

Lastly, the content of the apotropaic inscriptions augments the magical leanings of the Nuri stucco panel. The innermost section of the central frieze (fig. 5.4, mark-up 1) prominently presents, in an angular, square Kufic style, the names of Muhammad and the four caliphs (Abu Bakr, ‘Umar, ‘Uthman, ‘Ali), the words Hassan and Husayn, and the phrase: “peace be upon them.” The blessings echoed in communal prayer are visualized within the stucco panel, accounting for an inclusion of the Shi‘a community as well. The angular Kufic register is crowned with a framed trilobed arch motif (fig. 5.4, mark-up 2), shaped using the phrase *fasayakfīkahum*. The word Allah, generally adjoining the phrase, is isolated and forms the horizontal base of the niche. The entire phrase *fasayakfīkahum Allah* also shapes the two arches on the lateral structures, located beneath the epigraphic medallions. The Qur’anic word *fasyakfīkahum Allāh* can be translated as “and God is sufficient for you” (2:137) and is the longest word in the Qur’an, appearing on amuletic objects and funerary architecture in the medieval Islamic world (see Chapter 3).[63] Other prominent inscriptions, such as in the circular compositions, the tympanum of the lateral friezes, and the spandrels in the central frieze, include the repetition of the word Muhammad. The repetition of pious names was an act of remembrance or contemplation (*dhikr*) of God, especially in esoteric traditions such as Shi‘ism and Sufism.[64] The stucco panel visualizes both the repetition of names and an invitation to contemplate the names

[63] The combination of the arch and the phrase appears in various seals at the British Museum. See Venetia Porter, *Arabic and Persian Seals and Amulets in the British Museum* (London: British Museum Press, 2011), 12, cat. 220 and 226. The phrase also appears in mihrab panels placed in funerary settings, such as the mihrab at the Imamzada Yahya shrine in Varamin, and the shrine of Imam Rida at Mashhad, both dated to the thirteenth century. See Blair, “Art as Text,” 407–36. The motif is also seen later in Ilkhanid period coins, see Sheila Blair, “The Coins of the Later Ilkhanids: A Typological Analysis,” *Journal of the Economic and Social History of the Orient* 26, no. 3 (1983): 302.

[64] See L. Gardet, “Dhikr,” in *Encyclopaedia of Islam*, Second Edition, accessed November 1, 2021, http://dx.doi.org/10.1163/1573-3912_islam_COM_0162.

by presenting them in a circuitous form—the letters and names themselves being the source of the hidden or occult powers (see also Introduction and Chapters 3, 4 for occult powers of letters).

The inclusion in this panel of the image of the knotted bodies and the illegible script, would likely have allowed a variety of different demographics to visually partake in the magical. Persis Berlekamp iterates that multiple modes of efficacy can comfortably coexist in visual images.[65] For the recent converts and the laymen, the knotted designs in this panel would have been the primary focus. Like the dragon bodies, the knotted heart-shaped elements of the script were sites that could function as talismans, warding off evil through attracting sympathies with the celestial world. For the more literate audiences, deciphering the letters within the panel would have been an act of contemplation in itself. The circular composition of the script frames the perception of the text, locating the names of Muhammad and Allah within the context of cosmic creation—the circle representing the celestial and terrestrial worlds within the religious remit (see Chapters 2, 4). The form of script and shape also echoes the supernatural enclosures seen in the magical context (Chapter 4); in this case, the name of Allah framed and protected by the repetitions of Muhammad. The labyrinth chain of repeated words intensifies the magical qualities; one that invokes a continuous, endless protection.

Inscriptions from the eastern Islamic world illustrate that script encircling monuments and in circular compositions continued to be a part of the architectural decoration in the Islamic world. The decorative program inside the mausoleum of Shah Fadl (dated 1055–10360) is particularly intriguing for its use of epigraphic bands and

[65] Berlekamp, "Symmetry," 76–81.

medallions.[66] Located in the region of Safid Buland in present-day Kyrgyzstan, the mausoleum was built during the rule of the Qarakhanid dynasty (c. 992–1213) for the governor of Ferghana, Muhammad b. Nasr (d. after 1056) by his son Mu'izz al-Dawla 'Abbas.[67] The architectural structure comprises of a square base, an octagonal zone of transition, and a dome. Three bands of encircling inscriptions in Persian—one along the octagonal zone of transition, the second just beneath the zone of transition, and the third around the middle of the walls—incorporate different styles and sizes of Kufic script (see fig. 5.8). The second band features several U-shaped motifs on the upper half of the band in a manner similar to the folios of the *Kitāb al-diryāq* (see Chapter 1). This resemblance of script styles and its patterned appearance suggests a practice of visual translation between media as well as between geographies.[68] Signs of experimentation are also evident in the latter band: in the southeast corner of the tomb, where this inscription ends, a line of script is added to the top half of the band, suggesting that the craftsmen required more space to complete the inscription. The tomb decoration also includes two bands of roundels, both sets carrying Qur'anic verses in Arabic in circular configurations. The first set of eight roundels is part of the squinch decoration. One of the surviving frames employs Q45: 36–7, "In the Name of Allah, the Most Compassionate, the Most Merciful.

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[66] For a recent study of this monument, see Richard McClary, *Medieval Monuments of Central Asia: Qarakhanid Architecture of the 11th and 12th Centuries* (Edinburgh: Edinburgh University Press, 2020), 23–54. For a detailed description of the tomb and its decorative program, see also Ernst Cohn-Weiner, "A Turanic Monument of the Twelfth Century AD," *Ars Islamica* 6 (1939): 88–91.

[67] Dates for the ruler are unavailable to the author. For a discussion of the political system of the dynasty, see Svatopluk Soucek, "The Qarakhanids," in *A History of Inner Asia* (Cambridge: Cambridge University Press, 2000), 83–92.

[68] For image translations between book painting and metalwork during this period, see Julian Raby, "The Principle of Parsimony and the Problem of the 'Mosul School of Metalwork,'" in *Metalwork and Material Culture in the Islamic World: Art, Craft and Text: Essays Presented to James W. Allan*, ed. Venetia Porter and Mariam Rosser-Owen (London: I.B. Tauris, 2012), 11–85.

So to God belongs praise, the Lord of the heavens and the Lord of the earth, Lord of all Being. He is the Domination in the heavens and the earth; He is the All-mighty the All-wise." The second set, below the zone of transition, comprises of sixteen roundels (fig. 5.9; table 4, no. 11). An extant roundel from the south wall references the "most beautiful names of Allah," quoting Qur'an 59:24, "He is God, the Creator, the Maker, the Shaper. To Him belong the Names Most Beautiful. All that is in the heavens and the earth magnifies Him; He is the All-mighty, the All-wise."[69] The program of inscriptions in this square tomb chamber leads to a number of observations. First, all foundation inscriptions take the forms of encircling bands, while the roundels are reserved for Qur'anic materials. The foundation inscriptions are in Persian, while the Qur'anic in Arabic, though there is no visual differentiation in script or letter forms. Second, is the particular relevance of the roundels, both in its content and visual dimension. As the epigraphic bands are in Persian, the roundels are distinguished not only in visual form, but also in its communication of a sacred message. If one is to extend the argument of Late Antique prayer inscribed in the circular form, as discussed above, the roundels of the Shah Fadl tomb exhibit an identical relationship; that is, the sacred and the divine was embedded within the circle. This idea is further corroborated by the Qur'anic contents: the inclusion of the names of Allah and particular reference to them signals an element of oral repetition of such words, a trope witnessed in magical and mystical circles (see Chapter 4 and example above). The content of the Qur'anic inscriptions also makes particular reference to "heaven" and the "earth," which is in line with the function of the space as a

[69] For a complete translation of the inscriptions, see Sheila Blair, *The Monumental Inscriptions from Early Islamic Iran and Transoxiana*. Studies in Islamic Art and Architecture, v. 5 (Leiden: E.J. Brill, 1992), 128. For "the most beautiful names," see Glossary.

tomb chamber. However, the references have strong cosmological overtones, leading one to circular visual imaginations, and attesting to the formidable connections between the terrestrial and celestial worlds—not unlike the Late Antique examples. Lastly, when taken together, the epigraphic repertoire of the tomb chamber encourages haptic visuality; that is, the viewer touching the inscriptions with their eyes as they rotate themselves physically to grasp the image (see Chapter 6 for sight as a tactile sense; see Chapter 4 for circular movement in magical practice). The multiplicity of bands and the roundels is itself symbolic of the concentric frames in cosmological diagrams. The Late Antique and medieval examples—although geographically disparate—demonstrate that text-in-circles embodied the sacred, participating in the construction of a magical aesthetic. Prayers and pious phrases in a continuous loop not only encouraged a kinesthetic engagement, they also invited the viewer to pause, marvel, and contemplate the visual form of text and pattern.

5.3 Cosmic Names: Stars and Polygons in Architectural Decoration

In Late Antique mosaic floors, eight-pointed frames composed of interlocking squares can generally be interpreted in a magical context when combined with apotropaic text and designs.[70] Such is the case with the decoration at the Propylaea Church in Gerasa discussed above, where supplicatory text, encircling design, a series of interlacing and

[70] A number of scholars have discussed the magical significance of interlocking squares, which is also connected to interlacing and knotting. See Trilling, *The Language of Ornament*, 135; Henry Maguire, "Garments Pleasing to God: The Significance of Domestic Textile Designs in the Early Byzantine Period," *Dumbarton Oaks Papers* 44 (1990): 216–17; Ernst Kitzinger, "The Threshold of the Holy Shrine: Observations on Floor Mosaics at Antioch and Bethlehem," in *Studies in Late Antique, Byzantine and Medieval Western Art* (London: Pindar Press, 2002), 244–59. [70] For more examples of interlocking squares see Andreas Schmidt-Colinet, "Zwei verschränkte Quadrate im Kreis. Vom Sinn eines geometrischen Ornaments," in *Textilien aus Aegypten*, ed. A. Stauffer (Kat. Fribourg, 1991), 21–34.

guilloche borders, all form part of the design that contribute to augmenting the efficacy of the image. A similar eight-pointed frame is employed in a mosaic pavement at the Church of the Virgin, in Madaba from the sixth century—the set of interlocking squares framing a prayer inscription bound in a circular frame (table 4, no. 12). An octagon frame enclosed with a version of Solomon's knot and an inscription: "God is with us," appears on the floor along the nave in the church of Shuneh Nimrin in Jordan, further highlighting the image as a propitious and prophylactic emblem (for portable objects see Chapter 3).[71] This Late Antique motif manifests in Islamic visual culture as part of the mosaic pavement at the Khirbat al-Mafjar (table 4, no. 13). Part of a larger program of geometric designs on the pavement at the palace of the Umayyad caliph, Hisham b. 'Abd al-Malik (r. 724–43), this eight-pointed polygon is neither the largest nor the most visibly significant. Framed within a circle and a square, the motif has its vertices knotted — a visual trope employed within the entire mosaic program. The image resonates closely with the mosaic pavement of the Propylaea church, complete with the addition of an undulating circuit passing through the two interlocking squares. Building on Ernst Kitzinger's argument from Late Antique churches, Richard Ettinghausen interprets the possibility of an apotropaic value embedded within such an interlace and geometric program.[72] The pattern of interlocking squares and their repetition also features in the early Qur'an manuscripts of the Umayyad period, which closely mirror the repetition of squares and polygons in church floors—geometry and repetition defining a sacred visual

[71] Henry Maguire, "Magic and Geometry in Early Christian Floor Mosaics and Textiles," in *Rhetoric, Nature and Magic in Byzantine Art* (Aldershot: Ashgate, 1998), 268, and fig. 9.

[72] Richard Ettinghausen, *From Byzantium to Sasanian Iran and the Islamic World: Three Modes of Artistic Influence*. The L. A. Mayor Memorial Studies in Islamic Art and Archaeology, v. 3 (Leiden: Brill, 1972), 17–65.

in both cases.[73] In the medieval Islamic period, polygonal and star shapes are ubiquitous in monuments across geographic regions.[74] However, as in the other examples, the visual, cultural, and ritualistic context of the space can shed light on the meanings and significance ascribed to geometric images. The remainder for this section will take the case of the shrine (*mashhad*) of Sayyida Ruqayya located in Cairo to demonstrate that the six-pointed hexagram depicted within its mihrab (figs. 5.10 and 5.11; table 4, no. 14) embodied a cosmic sensibility through its geometric form.

The *mashhad* of Sayyida Ruqayya, dated between 1133 and 1153, is one of the largest and most remarkable shrines located in Cairo.[75] The shrine was constructed in Cairo based on a vision from a saint; the body itself is buried in Damascus. Not much is known of Ruqayya, except that she was the daughter of ʻAli b. Abi Talib (the Rightly Guided Caliph and the first Imam of Shiʻi Muslims). The significance of ʻAli is paramount in the Shiʻi interpretation of Islam, which was practiced by the governing body in Cairo at the time, the Fatimid Empire (909–1171). Between the tenth and twelfth centuries, ʻAlid shrines (related to ʻAli and his family) proliferated in Cairo and their popularity is attested by the monumental structures that were erected to support and encourage pilgrimage or visitation (*ziyāra*) to the site.[76] Saint veneration was not limited

[73] For Qur'an manuscripts, see Alain George, *The Rise of Islamic Calligraphy* (London: Saqi), 82–83; for Byzantine floor mosaics, see Maguire, "Magic and Geometry," 267–91.

[74] See Jay Bonner, *Islamic Geometric Patterns: Their Historical Development and Traditional Methods of Construction* (New York: Springer-Verlag, 2017).

[75] For a brief overview of the *mashhad*, see Doris Behrens-Abouseif, "Architecture of the Fatimid Period," in *Islamic Architecture in Cairo: An Introduction* (Leiden: Brill, 1989), 74–5.

[76] For an overview of ʻAlid shrines in Cairo see Caroline Williams, "The Cult of ʿAlid Saints in the Fatimid Monuments of Cairo, Part II: The Mausolea," *Muqarnas* 3 (1985): 39–60.

to Shi‘is; shrines generally—even ‘Alid shrines—were commissioned and visited by both Sunni and Shi‘a in the regions of medieval Jazira and Greater Syria.[77] The increase in pilgrimage sites and shrines, particularly in the twelfth and thirteenth centuries across the Islamic world, is also attributed to the growth and institutionalization of Sufism—practices that encourage spiritual development and a more intimate access to the divine than orthodox religious practice.[78] Despite their popularity and commissioning by political leaders, there was also opposition towards shrine veneration, often being labelled as heretic or idolatrous.[79]

Shrines are generally spaces where there has been some form of physical or supernatural contact with a saint or a holy individual: either a saint was buried, resided, or even passed by the area. Dreams and visions, as in the case with Sayyida Ruqayya, were a common occurrence for the construction of shrines—not only in the Islamic world but also in Late Antiquity and across the medieval Mediterranean.[80] The holy spaces invited pilgrims to their site, offering the visitors fulfillment of their wishes and desires, a cure for their physical ailments, and generalized *baraka* or blessings, through the intercession of the saint.[81] Touted as a site for miracles (*‘ajā’ib*), shrines were commonly known for supernatural healing: touching or kissing the tomb of the saint or ingesting the

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[77] For ‘Alid shrines in Syria, see Stephennie Mulder, *The Shrines of the ‘Alids in Medieval Syria: Sunnis, Shi‘is and the Architecture of Coexistence* (Edinburgh: Edinburgh University Press, 2019).

[78] See Sheila Blair, “Sufi Saints and Shrine Architecture in the Early Fourteenth Century,” *Muqarnas* 7 (1990): 35–49.

[79] For debates against shrine veneration, see Meri, *The Cult*, 126–40.

[80] For dreams and visions as part of saint veneration in the Byzantine empire, see Henry Maguire, “Likeness and Definition,” in *The Icons of their Bodies: Saints and their Images in Byzantium* (Princeton: Princeton University Press, 1990), 5–47.

[81] Meri, *The Cult*, 164.

soil from the site was a panacea for both humans and animals (see also Chapter 4 for similar practices of touching and ingesting in Byzantium).[82] Rituals associated with pilgrimage were more communal in nature and encouraged forms of collective supplication that involved reciting verses of the Qur'an as well as circumambulating tomb structures—the practice of recitation and movement also present in funerary spaces more generally as discussed above. The rituals and general environment of shrines is best portrayed by Ibn Jubayr (d. 1217), a travel writer from the Iberian Peninsula, in his observations at the twelfth-century shrine of Imam Husayn (the son of 'Ali killed in Karbala) in Aleppo, who is considered a martyr and revered by the Shi'a and Sunni populace:

> We observed men kissing the blessed tomb, surrounding it, throwing themselves upon it, smoothing with their hands the kiswa that was over it, moving around it in a surging throng, calling out invocations, weeping and entreating Glorious God to bless the hallowed dust, and offering up humble supplications such as would melt the heart and split the hardest flint. A solemn thing it was, and an awe-inspiring sight.[83]

The atmosphere at the shrine of Sayyida Ruqayya would have likely been similar to the above, given the large number of shrines in the city and the predisposition towards the supernatural world in Shi'i and Fatimid contexts.[84] In the midst of this charged environment, the *mashhad* of Sayyida Ruqayya, with its fluted dome structure and five intricately-carved stucco mihrab panels would have shaped the pilgrims' visitation and

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[82] For touching and ingesting related to the Qur'an, see also Travis Zadeh, "Touching and Ingesting: Early Debates over the Material Qurʾān," *Journal of the American Oriental Society* 129.3 (2009): 443–66.

[83] Muḥammad ibn Aḥmad Ibn Jubayr, *The Travels of Ibn Jubayr*, trans. Ronald J. C. Broadhurst (London: Jonathan Cape, 1952), 37.

[84] Williams, "The Cult of ʿAlid Saints," 53–4.

experience of the miraculous. The main mihrab—prayer niche—of the *masshad* is recognized as the "masterpiece" of stucco in medieval Egypt and was the most attractive ornament,[85] located on the wall of the central bay inside the sanctuary. Two less elaborate niche panels flank the central one, placed at each end of the qibla wall. Two additional mihrab panels are placed at the entrance gate outside the sanctuary—the five mihrabs have often symbolized the five personages of the *ahl al-bayt* (the family of the Prophet)—Muhammad, ʻAli, Fatima, al-Hassan, and al-Husayn. The extravagant central mihrab includes a recessed niche with a central medallion in a guilloche border—the subject of this case study—and radiating flutes, framed within a set of niches (fig. 5.10). This central medallion only appears on the main mihrab and features a hexagram, created using two interlocking triangles that carry six repetitions of the word Muhammad (fig. 5.11a–b). Inside the six-pointed star are the words "and ʻAli." The hexagram, placed at the centre of the ornate central mihrab, in one of the most focal points of the sanctuary is suggestive of the significance of the image. Unlike the stucco panel in the Nuri mosque, discussed above, which encloses the word Allah, the geometric construction in the *mashhad* includes the name of ʻAli—an individual with an infallible status and possessor of esoteric knowledge. ʻAli has been accorded the power to grant wishes, ward off evil, cure diseases, and features as a significant personage in other occult practices.[86] Paired with the name of Muhammad, the image and the incantation gains additional power and efficacy.

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[85] K.A.C Creswell, *Muslim Architecture of Egypt I, Ikhshīds and Fātimids, A.D. 939–1171* (Oxford: Oxford University Press), 247.

[86] See Robert Gleave, "'Alī b. Abī Ṭālib," in *Encyclopaedia of Islam*, Third Edition, accessed November 14, 2021, http://dx.doi.org/10.1163/1573-3912_ei3_COM_26324.

The central placement of the inscribed hexagram also Islamicizes the rituals and practices associated with saint veneration, encompassing them within the fold of religious piety and devotion. Within this religious framework, atleast in the Fatimid context, is the significance of the imam-caliph who is understood to be a direct descendant and an embodiment of ʻAli. The image of the hexagram can also be interpreted as a star enclosing the imam-caliph, asserting the significance of the ʻAli and the imam-caliph in both the terrestrial and the celestial world. The celestial image is further bolstered by the medallion with radiating flutes that circumscribes the hexagram, representing the sun. Ismaʻili theology at the time generously borrows from Neoplatonic cosmologies to articulate concepts of creation and the centrality of the Imam (see also Chapter 4).[87] The name of ʻAli with the image of the star and the sun in this manner provides an image of the celestial world infused with the names of the ʻAli and Muhammad, names that constitute the source of power and miracles. Executed in the midst of celestial imagery, the names take on a talismanic appearance. A Prophetic saying highlights the role of the Imam through a cosmic analogy: "the stars are a pledge to the world that it will not be drowned, and my family are a pledge to the Community that it will not go astray."[88] A poem attributed to al-Husayn expresses a similar perspective: "My father is a sun, my mother a moon, and I am the star, the son of two moons..."[89] The image of the star in

[87] See also script arranged in a hexagram on a Fatimid coin minted in Sicily dated 448 AH/1056 AD, British Museum 1857,0101.3. For Neoplatonist philosophy in Ismaʻili thought more generally, see Paul Walker, *Early Philosophical Shiʻism: The Ismaili Neoplatonism of Abū Yaʻqūb Al-Sijistānī* (Cambridge: Cambridge University Press, 1993).

[88] Williams, Caroline. "The Cult of ʿAlid Saints in the Fatimid Monuments of Cairo Part I: The Mosque of al-Aqmar." *Muqarnas* 1 (1983): 40.

[89] Williams, "The Cult, Part I," 46.

concert with the name of ‘Ali, as seen in the *mashhad* of Sayyida Ruqayya, can therefore be interpreted as symbolic of the Imam, the shining light of knowledge.

The cosmic significance of the names and images is also reinforced by the inscriptions within the *mashhad*. The foundation inscription beneath the ribs of the dome includes three verses of the Qur’an (7: 54–56), part of which reads: “Surely your Lord is God, who created the heavens and the earth in six days—Then sat Himself upon the Throne, covering the day with the night it pursues urgently—and the sun, and the moon, and stars subservient, by His command…”[90] The Qur’anic verses augment the celestial environment, creating an image of cosmic creation, with the names of ‘Ali and Muhammad in the hexagram visualizing the Qur’anic verse. The inscription on the lintel of the central mihrab—above the hexagram—is part of Q33:33: “O People of the House, God only desires to remove you from the impurity of sin, and to purify you.” The text is inscribed in a Kufic style, with extensive knotting evident in the upper stems of the letters that pairs well with the apotropaic Qur’anic verse (see section above for knotting letters and their magical interpretation). The mihrab placed outside the sanctuary, on the right side, invites the pilgrim into the *mashhad* by emphasizing the protective nature of the portal: “draw near and fear not, for surely thou art in security” (Q28:31). When the pilgrim approaches the saint’s cenotaph, placed under the dome, they are once again greeted with inscriptions that reference cosmic creation and verses of refuge from the Qur’an (Q112; 113: 1–3).[91]

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[90] For a complete translation, see Williams, “The Cult, Part II,” 44.

[91] For a translation of the inscriptions of all the mihrabs and the cenotaph, see Williams, “The Cult, Part II,” 47.

The cosmic representation of names in the star form also appears in other *mashhad*s in Fatimid Cairo, such as in the *mashhad* of Yahya al-Shabih (c. 1145), in fragments of the medallion in the *mashhad* of al-Hasawati, and at the apex of the dome in *mashhad* of Badr al-din Jamali (d. 1094), the vizier to the Fatimid caliph.[92] The hexagram motif of Sayyida Ruqayya, placed in a site charged with apotropaic inscriptions, celestial imagery, and supernatural intervention, suggests that the names and their formal representation contributed to shaping a cosmological and talismanic environment for the pilgrims.

5.4 Shapes as Augmenting Magic in Coinage

Images in numismatics (in the Jazira and neighboring regions) are particularly provoking during the twelfth and thirteenth centuries, with the proliferation of both figural and geometric representations that represent a departure from earlier Islamic coins.[93] The coins are also particularly reflective of the diverse political and cultural climate of the period, exhibiting interactions and exchanges with Byzantine and Latin Crusader principalities (see Introduction for historical context).[94] A great range of experimentation and iconographies can be seen in the coins of the earlier dynasties, such as the

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[92] For a discussion of the monuments, see "The Cult, Part II," 39–60. For *Yahya al-Shabih*, see Bernard O'Kane and Bahia Shehab, "The Mausoleum of Yahya al-Shabih Revisited," in *Art, Trade, and Culture in the Islamic World and Beyond*, ed. Alison Ohta, Michael Rogers, Rosalind Wade Haddon (London: Gingko Library, 2016), 48–55.

[93] For a catalogue of coins from the Jazira, see William Spengler and Wayne Sayles, *Turkoman Figural Bronze Coins and Their Iconography*, 2 vols. (Lodi, Wis: Clio's Cabinet, 1992); and Estelle Whelan, *The Public Figure: Political Iconography in Medieval Mesopotamia* (London: Melisende, 2006).

[94] For this point, see also Taef al-Azhari, "Diplomatic Relations and Coinage among the Turcoman, the Ayyubids and the Crusaders: Pragmatism and Change of Identity," in *Syria in Crusader Times: Conflict and Coexistence*, ed. Carole Hillenbrand (Edinburgh: Edinburgh University Press, 2020), 105–24.

Danishmendids (c. 1104–78), who were the first Muslims to issue coins with their names in eastern Anatolia (discussed below), and the Artuqids (both the Hisnkayfa/Amid and Mardin branches). Coins from these dynasties employ multilingual text (Greek and Arabic), as well as images of Christ, Virgin Mary, angels, saints, classicizing busts, and astrological symbolism—many of which mirrored the Byzantine copper coins that were also circulating in the region until the early thirteenth century.[95] The iconography on the coins has been often interpreted as a means for the Turkish rulers to assimilate with the diverse local population, while asserting their rule and sovereignty.[96] However, the syncretic visual vocabulary of the coins has also been interpreted as astrological references, and as embedded with mystical references.[97] This section will build on the astrological and magical vocabulary represented on the coins and the ways in which square and circular shapes featured within them.

From Mardin, a copper coin of Najm al-Din Alpi (r. 1154–76) includes a square marginal inscription to enclose two front-facing diademed heads on the obverse, separated by a dot (table 4, no. 15). On the reverse, a single head is framed by a beaded circle, also surrounded by a four-part inscription. Copper coins of this variety were struck in large numbers and circulated widely; they are one of the most common extant figural coins from this period. The iconography of diademed heads follows closely the images

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[95] Nicholas Lowick, "The Religious, the Royal, and the Popular in the Figural Coinage of the Jazira," in *The Art of Syria and the Jazira, 1100-1250*, Oxford Studies in Islamic Art 1, ed. Julian Raby (Oxford and New York: Oxford University Press, 1985),167.

[96] Whelan, *The Public Figure*, 16–36.

[97] For astrological symbolism, see Spengler and Sayles, *Turkoman Figural Bronzes* v.1, xix-xx; for mystical elements in Artuqid coins, see Suzan Yalman, "'Ala al-Din Kayqubad Illuminated: A Rum Seljuq Sultan as Cosmic Ruler," *Muqarnas* 29 (2012): 159–67.

featured on the gold solidus of the Byzantine emperors Justin II (r. 565–78) and Tiberius II (r. 574–82), minted in Constantinople in 578 AD.[98] The inscription on the obverse starts directly above the figures and continues along the bottom, containing the formulaic *shahāda*. Followed by the right and left frames, written in opposite orientations, is the name of the Abbasid caliph at the time, al-Mustanjid Billah (r. 1160–70). While no geometric lines accompany the inscription, the inclusion of four separate phrases, and its non-sequential positioning indicates that a four-part image is being presented. The combination of image and text can be interpreted as the depiction of both the Artuqid and Abbasid rule, similar to the Byzantine model, especially as this was the first time that both the *shahāda* and the Abbasid caliph were acknowledged on the coin.[99] Spengler and Sayles have also interpreted the image of two busts as a representation of the zodiac, Gemini, complementing the depiction of Virgo on the reverse of the coin—being the day and night houses, respectively, of the planet Mercury.[100] The Artuqid courts are known for their "classical revival" more generally, including commissioning of astronomical works such as the *Kitāb Ṣuwar al-kawākib al-thābita* (*Book of Fixed Stars*) in Mardin (see Introduction). Personifications of the zodiac and the planets are evident across the region during this time, both in the courtly sphere and amongst the common man, be they Christian, Muslim, Jew, or others—astrological images had a popular appeal.[101] One of

[98] Spengler and Sayles, *Turkoman*, 1: 88.

[99] Ali Minyat, "Cultural and Socio-Economic Relations Between the Turkmen States and Byzantine Empires and the West with a Corpus of the Turkmen Coins at the Barber Institute Coin Collection," PhD diss., (University of Birmingham, 2017), 177–8.

[100] Spengler and Sayles, *Turkoman*, 1: 86–8.

[101] Lowick, "The Religious," 171–2. For astronomical and astrological personifications across Seljuq Iran and the Jazira, see Deniz Beyazit, "Astrology, Magic, and the World of Beasts," in *Court and*

the innovations in this coin, however, is the conscious move towards enclosing the astrological sign within a square composition, the image redolent of symbolizing the night sky in horoscopes of the period (see Chapter 3).

More interestingly, Najm al-Din's successor, Qutb al-Din Il-Ghazi II (r. 1176–84) emphasizes the square boundary by using geometric lines to further define this motif. In his coins, the square encloses a profile of an antique bust, whose eyes face towards the sky; the quadratic inscription carries the names of his predecessors (table 4, no. 16). The Roman-looking bust closely resembles the portrait of the famed Byzantine emperor, Constantine the Great, as depicted on his gold solidus. The image of the likeness of Constantine in this manner speaks to the ruler's desire to legitimize and bolster his significance in the eyes of his political rivals. The image is also often associated with the personification of the sun, intertwining with elements of the power, divinity, prosperity, and apotropaia on a more popular level.[102] Given that the images on the coins were not exact replicas of ancient coins, but rather a conscious and selective process by the rulers of the Artuqid dynasty, the use of a square to circumscribe the image of power would have also been a meaningful addition. For instance, the use of incuse squares can be seen in Greek tetradrachms from the second century BC that surround profile busts.[103] I argue that this high-valued copper coin,[104] also exhibits power on a cosmic level through the

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Cosmos: The Great Age of the Seljuqs, ed. Sheila Canby et. al. (New York: Metropolitan Museum of Art, 2016), 198–249.

[102] Maguire, "Magic and Money," 1037–54.

[103] See for instance the silver coin at the American Numismatic Society, 1927.999.88, minted in Abdera, Thrace. The coin employs Apollo (often associated with the Sun) within a square. www.numismatics.org/collection/1927.999.99

[104] The inscription on this coin calls it a *dirham* – a term generally reserved for silver coins. The use of the term *dirham* might also be for political reasons. For more on minting larger quantities of copper

use of the square enclosure. The image of a square within a circle is a popular motif in scientific manuscripts of the period, representing both the terrestrial and the celestial worlds (see Chapter 2). The antique portrait—presumably representing the Artuqid ruler—within this cosmic spectrum seeks to further highlight the importance of the ruler; not only by connecting him to antiquity, but also justifying his central role in the celestial imagination. This claim may be further corroborated by a similar design in the coin of Badr al-Din Lu'lu' at the David Collection C307 that has a small six-pointed star beside his portrait. This charged image would have likely played a similar magical role as the portraits of Constantine. One of the extant copper coins of Najm al-Din Alpi at the Barber Institute Coin Collection TK372 even exhibits a piercing, suggesting that the coin may have been attached to clothing or jewelry.

Astrological images on coins became common towards the end of the twelfth century, particularly in Mardin. For instance, the copper coins of Husam al-Din Yuluq Arslan (r. 1184–1200) employ personifications of the planet, Mars, represented by a seated human figure holding a severed head in one hand, and a sword behind his head in the other.[105] His successor, Nasir al-Din Artuq Arslan (r. 1200–1239), minted coins with the personification of Sagittarius in the form of a centaur-archer shooting an arrow at a dragon. Both images were widespread during the twelfth and thirteenth centuries, appearing in manuscripts, metalwork, ceramics, and architectural decoration.[106] In the coin of the latter ruler from the David Collection C191 a circular legend inscribing the

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coins and the shortage of silver, see Michael Hendy, *Coinage and Money in the Byzantine Empire 1081–1261* (Washington D.C.: Dumbarton Oaks Center for Byzantine Studies, 1969), 511–2.

[105] See, for instance, the coin held at the David Collection, C297.

[106] Whelan, *The Public Figure*, 16–36.

date (559 AH) and the city of Mardin frames the image of Sagittarius—the remainder of the phrase inscribed in the body of the coin (table 4, no. 17). The encircling script is also accompanied by a circle along the stems of the letters, one that can be seen as a version of Linear Kufic style (see Chapter 3 for Linear Kufic in magical objects). A later coin of the same ruler portrays an equestrian figure riding a lion, with an encircling inscription presented in the Kufic style, the base of the script forming the circle in this case (table 4, no. 18; and fig. 5.12). The equestrian image, when seen in public monuments and coins has often been interpreted as the representation of saints, and in this coin, the lion rider is sometimes seen as St. Mamas, the Christian saint buried in Kayseri—a saint venerated by Muslims as well.[107] The astrological image, the image of the saint, and the encircling Linear Kufic—all part of magical vocabulary discussed in preceding chapters—suggest that coins also participated in the magical medieval worldview.

The distinctions between sovereignty and magic become particularly blurred when examining the close connection between coins and seals. On the early Danishmendid coins, the dynasty ruling eastern Anatolia, Greek script and Christian motifs were widespread.[108] The Danishmendid were significantly affected by the Crusades and might have incorporated local iconographies to maintain and justify their rule. Interestingly, part of their adoption also included invocations that were prominent in Byzantine seals and magical objects. In particular, the excavations in Antioch revealed a

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[107] For the equestrian image in Anatolia more generally, see Oya Pancaroğlu, "The Itinerant Dragon-Slayer: Forging Paths of Image and Identity in Medieval Anatolia," *Gesta* 43, no. 2 (2004): 151–64. The lion-rider also appeared in the coinage of the Danishmendid in the second half of the twelfth century, see Estelle Whelan, "A Contribution to Danishmendid History: The Figured Copper Coins," *Museum Notes (American Numismatic Society)* 25 (1980): 145–7; For St. Mamas and the lion-riding figure, see Minyat, "The Cultural," 232–4.

[108] For a description of the coins, see Whelan, "A Contribution,"133–66.

coin of the ruler, Amir Ghazi (r. 1104–1134), with a fragmentary inscription on the obverse of the coin that reads: "Lord Help Amir."[109] Such an inscription may be interpreted in a number of different ways, but it does illustrate that the coins were a mechanism to portray the ruler's relationship with or position in the world—one that often extends into the supernatural realm. In another coin from this dynasty, an inner inscription in Arabic is accompanied by marginal inscriptions that use Greek uncials to portray the name of the ruling caliph (table 4, no. 19). The inscription reads: "The great amir Dhu'l-Nun." A likely explanation for the use of Greek script in this manner is for the local population in the region to be able to read the name of their ruler. The visual pattern depicted as encircling Greek script, with its base oriented around the central circle, is also identical to the Greco-Roman seals which employed a similar visual mechanism to illustrate verbal information. In fact, while the content of the Greek inscription follows an Islamic protocol, the circular pattern exhibits marked similarities with Byzantine personal seals.[110] Whelan attributes the use of Greek script to the lack of mints in Anatolia during the time, where seal cutters would likely have been assigned to design and craft the coins.[111] The two examples of the Danishmedid coins demonstrate that while acclimatizing with the local population and visual iconographies, the rulers also adopted the cultural (and magical) role of coins.

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[109] Related coins from the find are also discussed in Minyat, "The Cultural," 106–11. See also Stefan Heidemann, "Die Fundmünzen von Harrān und ihr Verhältnis zur lokalen Geschichte," *Bulletin of the School of Oriental and African Studies*, 65 (2002): 267–99.

[110] Whelan, "A Contribution," 138.

[111] Whelan, "A Contribution," 139.

The resemblance between coins and seals is also apparent elsewhere in the region, particularly as we trace the trajectory of circular frames. For instance, the coin of the Artuqid Nur al-din Muhammad bin Qara Arslan (r. 1167–85) employs a circular inscription to enclose an antique bust (table 4, no. 20). A similar representation appears in a lead seal of 'Ala' al-Din Kayqubad (r. 1220–37), in which both sides frame the central image—of an antique bust on one, and image of a lion on the reverse—using a circular enclosure coupled with an encircling script (table 4, no. 21). Suzan Yalman argues for the cosmic and mystical symbolism of the seal image as well as of Artuqid coins by delineating the role of the Shihab al-Din Suhrawardi (d. 1191), the shaykh known as an "illuminationist."[112] Such visualizations also find parallels in coins of the Frederick II Hohenstaufen (r. 1220–1250), the Holy Roman Emperor, that employ an antique bust fashioned after emperor Augustus (r. 27 BC–14 AD) with marginal inscriptions in a circular form. Known as *augustalis*, such coins are pervasive in Byzantine jewelry primarily for their apotropaic qualities (see also Chapter 4). Given that the visual composition—of encircling script around a central image—was actively consumed in a magical capacity, its presence on coins in an identical manner suggests that its magical reception was concomitant to its representation of sovereignty and rulership.

Conclusion

The chapter demonstrates that script patterns appearing in architecture and numismatics are not neutral entities; they create meaning within the space and shape viewer perceptions of the object. The magical frameworks in urban settings, the iconographies,

[112] Yalman, "'Ala al-Din," 151–86.

and the script patterns establish that magic is not reserved for personal and private practices and constitutes an important element in public and congregational settings. Moreover, the spaces and objects discussed in this chapter are also directly related to political patronage, illustrating that magic and magical practices were important elements of the interconnected medieval worldview, integrating terrestrial and celestial worlds.

The discussions related to each of the shapes commence with some examples related to their meaning and usage in Late Antiquity, establishing medieval Islamic patterns as a continuation—or a conscious revival—of Late Antique modes of visual and supernatural thinking. Many of the medieval examples where script patterns are particularly prominent feature in places that already have an association with the supernatural: tombstones; mosques; shrines; and deal with themes of either death or divinity. They are places of comfort and healing, towards which people gravitate in times of grief and despair with the hope that the invisible forces may aid in their wellbeing. They are portals that connect one beyond the terrestrial world. The section on quadrilateral shapes emphasizes the prevalence of the shape in funerary architecture, where the shape carries the name of the deceased—or the maker—bound within a prayer. As in the magical materials discussed in Chapters 3 and 4, powerful symbols are often employed together as a means of strengthening their magical force. As such, the quadrilateral script shape is paired with apotropaic verses and the mihrab image to augment its protective nature and capacity for *baraka*. In the next section, the two examples of circular epigraphic medallions in Mosul and Safid Buland highlight form as an embodiment of the sacred and the divine, shaping the viewer's religious experience as an extension of the familiar, supernatural context. The Mosul panel, in particular,

reinforces the celestial connection through the extensive knotting of its letterforms that mimic talismanic imagery. Cosmic forces also inform the hexagram motif in the *mashhad* of Sayyida Ruqayya in Cairo. The star pattern represents the imam-caliph at the helm of a structure that is charged with divine intercession. Lastly, the chapter briefly examines numismatics from Jazira and eastern Anatolia where the ruler and sacred imagery are placed within cosmological motifs, such as square-in-circle or circular frames, thereby creating a popular appeal for the images—one that extends into the supernatural realm.

Although the chapter is divided across geometric categories, the examples illustrate that the categories are not mutually exclusive. For instance, the hexagram motif at the Cairo *mashhad* is enclosed within a medallion; and circumambulation is not limited to circular shapes as is evident in the rectangular orientations of the tombstones. The diverse geographic and temporal examples presented in this chapter further highlight that similar visual patterns and rituals can be observed across time and space in the medieval period. This mobility of pattern suggests either that geometric shapes—particularly text arranged as shapes—were embedded with magical agency, or that they were consciously ascribed with magical meanings by placing them in contexts that fall on the border of occult practices. In any case, the combination of the geometric shape, powerful words, and magical contexts constitutes an image capable of supernatural intervention.

Chapter 6 Rereading the Diagrams of the *Kitāb al-diryāq*

This chapter returns to the manuscript of the Paris *Kitāb al-diryāq* (BnF arabe 2964) to offer a rereading of the intricate geometric and calligraphic compositions of the treatise in light of the preceding chapters. Chapter 2 illustrated that geometric shapes were copiously employed in Arabic scientific manuscripts in the twelfth and thirteenth centuries as a means of organizing and visualizing information. In doing so, the diagrams were instrumental in forging visual relationships, generating order, and creating connections between the microcosm and the macrocosm. Chapters 3–5 demonstrated that geometric shapes also play a role within the magical environment, framing powerful images and harnessing the celestial world. When paired with meaningful text, word and shape become particularly efficacious. This efficacy is part of the magical imagination wherein the whole is greater than the sum of its parts. The chapters also illustrated that there is a negotiated agency in the magical process: a combination of powerful image and the role of sight in activating the image. By demonstrating that the geometric script shape contributes to the magical process, I argued that they are also embedded with magical meanings. Organizing knowledge in geometric arrangements not only shapes viewer experiences and the medieval imagination, but the combination of script and shape can be seen as powerful agents capable of interaction with the hidden world—particularly in the domains of magic, medicine, religion, and the cosmic world.

The *Kitāb al-diryāq* is particularly intriguing in this regard as the content of the treatise is an amalgamation of pharmacology, literary biography, narrative, and cosmology (see Chapter 1). In the medieval imagination, the theriac—the subject of the manuscript—was hailed as a miraculous drug, one that could alleviate all types of physical and mental ailments, and was not reserved primarily for snake and scorpion bites (see the benefits of the theriac recipes given in

Appendix). Part of the miraculous nature of the drug comes from the fact that the theriac was difficult to produce, making it a rare and expensive commodity.[1] For instance, the theriac recipe of Galen described in the manuscript takes ten years and six months to perfect (Appendix, page 73). As such, the drug was generally reserved for the elite. However, while the theriac itself was difficult to obtain, knowledge about this wondrous drug was widespread in the popular imagination—the *Kitāb al-diryāq* being a paradigmatic example. Rather than a scientific manual, the *Kitāb al-diryāq* narrates the development of the theriac in the form of a series of anecdotes (for a description of the narratives associated with the discovery of the theriac, see Appendix, pages 24, 19, 22, 5, 6). The figural illustrations complementing the text feature individuals from all social classes—rulers, ministers, physicians, farmers, court attendants—suggesting that the curative properties of the theriac were known amongst all social classes.[2] In almost every narrative illustration within the manuscript, the miraculous effect of the theriac is emphasized as an antidote to snake poison or for the treatment of other diseases, such as leprosy. In the text as well, each of the theriac recipes are referred to as being of "perfect craftsmanship (*muḥkam al-ṣan'a*)" (see Appendix, pages 13, 16). As discussed in the preceding chapters, snakes and serpents feature copiously in magical contexts, often also symbolizing demons. Thus, the medieval conception of the theriac includes both its pharmacological properties and the social imagination that hinges on the magical.[3] For the medieval viewer, the theriac is a medical marvel and the *Kitāb al-diryāq* and its geometric diagrams would have likely been approached from

[1] The ingredients for Galen's recipe and preparation are described in Gilbert Watson, *Theriac and Mithridatium: A Study in Therapeutics* (London: Wellcome Historical Medical Library, 1966), 71–82. See also Appendix for the list of drugs in the recipes of the manuscript under study.

[2] For a complete discussion on the figural illustrations of the manuscript see Oya Pancaroğlu, "Socializing Medicine: Illustrations of the *Kitāb al-diryāq*," *Muqarnas* 18 (2001): 155–72.

[3] For the connections between theriac and magic, see also Christiane Nockels Fabbri, "Treating Medieval Plague: The Wonderful Virtues of Theriac," *Early Science and Medicine* 12, no. 3 (2007): 252–7.

such a framework. This chapter delves deeper into the visual imagination and the philosophical worldviews that contribute to the production and reception of the theriac more generally in the medieval period, and the diagrammatic compositions of the manuscript, in particular. As Chapter 1 illustrates, the nine diagrams of the manuscript present carefully embellished and intricate geometric figures that form a significant portion of the treatise. This chapter explores the multivalent nature of the diagrammatic images, taking into account the process of crafting the diagrams as well as the possible modes of reception of such images. By focusing on the complexity of relationships inherent within each diagram and the relationships amongst the diagrams in the manuscript, this chapter offers a rereading of the images in light of the visual and intellectual knowledge of Late Antiquity and the medieval period gathered from the preceding chapters. The discussion attempts to answer the questions raised in Chapter 1: *What do these relationships [within the diagrams] represent or signify? What kinds of knowledge and meanings are being generated by the diagrammatic images?* The chapter articulates the diagrams through four interconnected interpretations: diagrams as visual metaphors; diagrams as objects of wonder; diagrams as magical embodiments; and diagrams as sources of healing. Each subsequent category builds on the previous one to illustrate the multivalent nature of the ambitiously crafted pages of the *Kitāb al-diryāq.*

6.1 Diagrams as Visual Metaphors

As a treatise dealing with health and medicine, and identifying itself as part of the *jawāmi'* tradition, the *Kitāb al-diryāq* is not unique in utilizing diagrammatic representations—many of which can be seen in contemporaneous manuscripts (see Chapter 2). Where the *Kitāb al-diryāq* diverges from the scientific materials is the opulence of the treatise: a program of figural

illustrations; use of color; and ornamental script. As the descriptions in Chapter 1 illustrate, the scribe has invested time and resources not only to communicate knowledge of the theriac, but the attention paid to visual balance, symmetry, page layout, proportion of script amongst others, indicates his desire to astound the audience of the manuscript. Aesthetics are thus an important consideration in evaluating the treatise. One of the dominant themes in Arabic philosophy and poetics that helps to explain the significance of the diagrammatic form is the concept of "similarity" or "likeness." Between the tenth and thirteenth centuries, the Aristotelian concept of mimesis was adapted in the realm of Arabic philosophy and poetics, where mimesis (*muḥākāt*) and its paired variant, simile (*tashbīh*), were interpreted as "likeness" and "comparisons."[4] Mimesis was understood less as a strict imitation or representation of nature as explicated in the Greek readings, instead *muḥākāt* was articulated as exhibiting similarities or inviting comparisons through metaphors.[5] Generating mimesis (that is, similes and metaphors) was central in medieval Arabic poetry, and was articulated by philosophers as part of syllogistic reasoning.[6] Discussing in the realm of poetics, the philosopher Abu Nasr al-Farabi (d. 950) explicates the craft (*ṣan'a*) of *tashbīh* as one that "brings two different elements together in a corresponding way in an image."[7] Generating similitudes (*tashbīh*) was an avenue to elucidate a concept by forging a relationship with ideas that are more well known. This strategy is also

[4] Lara Harb, *Arabic Poetics: Aesthetic Experience in Classical Arabic Literature* (Cambridge: Cambridge University Press, 2020), 83–88. See also Valérie Gonzales, "The Founding Aristotelian Concept of Mimesis in Islamic Aesthetics," in *Insights on Islamic Aesthetics, Visual Culture, and History* (Sarajevo: Kult-B, 2006), 93–110.

[5] Harb, *Arabic Poetics*, 83.

[6] Harb, *Arabic Poetics*, 17, 82–3.

[7] Abu Nasr al-Farabi and A.J. Arberry, "Farabi's Canons of Poetry," *Rivista degli Studi Orientali* 17 (1938): 272.

utilized in the *Kitāb al-diryāq*, wherein the scribe explicates the value of the different components of the theriac by inviting comparisons with the princely realm. For instance, the text equates the *iqrāṣ al-afā'ī*, (viper pastilles) to the king; the *iqrāṣ al-asqīl* (scilla pastilles) to the youth entertaining the king; and the *maṭbūkh* (cooked viper flesh) to the slaves at the service of the king (for a complete list, see Appendix, page 71). Creating comparisons in this manner extended beyond the poetic realm and into the visual arts. The *Rasā'il* employs identical nomenclature for craft (*ṣan'a*) and mimesis (*tashbīh*) in their discussion of the visual arts (see below). The parallel relationship between the art of poetry and the art of painting (*ṣan'a al-tazwīq)* is explicated by al-Farabi who notes that "their forms, their activities, their intentions" are similar even though "the materials of their craft differ." He further claims that "in practice both produce likenesses (*tashbīh*) and both aim at impressing men's imaginations and senses with imitations."[8] Arabic poetics in the medieval period thus offer a parallel perspective in exploring the broader concepts of aesthetics in the visual arts (for more on poetry see also section 6.2). The process of creating analogies and comparisons in this way through diagrammatic structures, as in the pages of the *Kitāb al-diryāq*, can be seen as a cognitive map for the scribe—the diagrams visualizing the scribe's perception of the theriac and its inner working (see also Introduction for diagrams as cognitive devices). The discussion in this section invites a comparison between the diagrams of the *Kitāb al-diryāq* and the wider visual landscape of the natural and supernatural worlds examined in the preceding chapters, taking into consideration the medieval cultural aesthetic discourse.

In the following paragraph, I will demonstrate that the diagrams are visual metaphors of medieval medical principles—that is, the diagrams elucidate the theriac as analogous to the

[8] al-Farabi and Arberry, "Farabi's Canons," 278.

functioning of humoral medicine. The diagrams of the *Kitāb al-diryāq* typically include names of the drugs that comprise the theriac, together with the pharmacological effect of individual and multiple combinations of drugs (see Chapter 1 for a complete description of the diagrams). In doing so, the scribe is drawing from existing literature on simple and compound drugs that embody theories of "Galenism" prevalent in Late Antiquity—that is, the body as comprising of four humours. A healthy body is the result of a balance of the four humours and illnesses are the product of such an imbalance. The Late Antique "Galenism" connected the four humours with the four primary qualities, the four elements, and the four major organs, among others (see Chapter 2). The emphasis on the number four led to representations that visualized the humors and their intersections with the elements and qualities. The four-part schematic representations of Late Antique theories were prevalent in the *jawāmi'* literature (see Chapter 2). Most pertinent of these is the quadratic composition of the *Jawāmi'* BL Or. 9202 discussed in Chapter 2, where four vertices represent the four primary qualities and their relationship with the four elements (Chapter 2, figs. 2.4a–c). In an identical manner, the first diagram of the *Kitāb al-diryāq* comprises four vertices that enclose the four main drugs in the recipe; the fifth denoted by a central medallion (see Chapter 1, diagram 1). The primary function of both diagrams is the visualization of conceptual relationships. However, there is a considerable difference in the nature of the relationship presented: the former treatise illustrates points of connection or divergence between the four components; in the theriac recipe, the diagram presents a visual sense of convergence of varying entities, with the central medallion playing an instrumental role in uniting the component parts. In the former manuscript, the diagonal segments illustrate the relationship between the two vertices. In the latter, the diagonal segment is not one continuous line; rather the central circle functions to disconnect converging lines. The relationship exhibited

in the theriac recipe is between the vertex and the center. Unlike the squares of opposition that likely gave rise to the BL Or. 9202 figures, there is no inherent opposition featured in the *Kitāb al-diryāq* diagrams. Why did the scribe then choose to represent the theriac recipes in this manner, particularly when such diagrams were associated with contrariety? I argue that by drawing on visual tools available to the scribe, the diagrams create a likeness or an association with humoral medicine and "Galenism." This association includes the humoral, elemental, and primary qualities that dominated medieval medicine and profusely employ the four-part geometric shape to represent their ideas. The significance attributed to the four-part construction can be highlighted in Late Antiquity when Galen's initial list of three organs (heart, brain, liver) was augmented with a fourth (spleen), in order to adhere to the four-part system, among other four-part conceptual relationships.[9] In the *Kitāb al-diryāq*, the first diagram naturally lends itself to a four-part construction as it includes four drugs in its recipe. The subsequent diagrams, however, include a significantly larger number of drugs; yet the scribe maintains the emphasis on the four vertices (see Chapter 1, diagrams 2–6, 8). The four drugs in most of the diagrams are given visual prominence by distinguishing them through color coding and orienting them on a diagonal plane (diagrams 2 and 3). In the recipe of the physician Magnus (diagram 6), for instance, the scribe has further ornamented the cells of the four vertices, despite the fact that two of them include more than one ingredient. The significance, not only of the quadratic composition, but of the vertices is highlighted in all of the diagrams of the *Kitāb al-diryāq*, including the circular ones. The two circular compositions (diagram 7 and 9) are not only framed in quadratic enclosures, but the scribe has included triangular ornamental motifs that visually

[9] Peter Pormann and Emilie Savage-Smith, *Medieval Islamic Medicine* (Washington D.C., Georgetown University Press, 2007), 10, n.10.

reinforce the image of the vertices. The frontispiece illustration of the manuscript has been interpreted in a similar vein, the four-winged figures representing the four-part humoral or elemental composition.[10] The diagrams can, therefore, be likely seen as representations of the Galenic worldview.

Medical pathology in the medieval world intersected with cosmological principles, whereby the human body was understood as a microcosm to the macrocosm of the cosmos (see Chapter 2). In this relationship, the celestial bodies and their movements were directly connected to and affected the workings of the human body.[11] Astrology was an influential exercise allowing physicians and philosophers to explain rationally shifts in health and bodily conditions. According to the astrologer Abu Mash‘ar al-Balkhi, the physician in his role studies the terrestrial causes of diseases, whilst the astrologer concentrates on the astral origins, making astrology “higher and nobler than medicine.”[12] In the study of the *Kitāb al-diryāq*, the structure of the treatise, the illumination and illustrations, and the intended audience suggest that the scribe was less concerned about the practical application of the drugs. Medicine and pharmacology were, in fact, part of the larger framework of the “transmission of knowledge” genre—an idea well developed in the narrative illustrations and a central theme of paintings in Arabic illustrated books of the twelfth and thirteenth century.[13] This broader outlook of the manuscript suggests an association with natural philosophy and astrology that is corroborated by the frontispiece. The

[10] Pancaroğlu, “Socializing,” 165.

[11] Pormann and Savage-Smith, *Medieval Islamic Medicine*, 43.

[12] Abu Ma‘shar al-Balkhi, *Kitāb al-Madkhal al-kabīr ila ‘ilm aḥkam al-nujūm (The Great Introduction to the Science of the Judgement of the Stars)*, 9 vols. (Napoli, 1995–6), 2: 14–5, quoted in Saif, “Between Medicine,” 315.

[13] For a discussion of this idea in the *Kitāb al-diryāq* see Pancaroğlu, “Socializing,” 155–72.

double frontispiece with personified representations of the moon and the pseudo-planet, *jawzhar,* have led many scholars to identify the images as apotropaic or talismanic.[14] Prefacing the medicinal recipes in this way, the scribe is orienting the reader from the outset, establishing the treatise as more than didactic pharmacopeia. The final diagrams of the *Kitāb al-diryāq* in the form of concentric circles (Chapter 1, diagrams 7 and 9) can, therefore, be interpreted in a similar light, as cognitive maps that imitate the depiction of the cosmos (for scientific comparisons, see Chapter 2). In this sense, the theriac diagrams are a metaphor of the celestial world, whereby the final, perfected recipe of the theriac echoes the circular movements of the cosmos. As the celestial bodies were ultimately responsible for the efficacy of the drug, resemblances between the celestial and the terrestrial worlds were seen as instrumental in astrological epistemology.[15] The circular diagrams of the *Kitāb al-diryāq* amplify this cosmic connection of the theriac.

Antique and medieval representations of the cosmos often intersect the four primary qualities and the four elements, as seen with the BL Or. 9202 figure (see Chapter 2 and discussion above). In addition to diagonal-in-square representations, the qualities-elements combination also manifests as two intersecting squares.[16] The resulting eight-sided shape becomes symbolic of a "giant cosmic model" that encompasses the properties of the terrestrial and the celestial world [17] (see also Chapter 3 for interpretations of the octagon; see Chapter 2 for

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[14] For a discussion of the many interpretations of the frontispiece see Pancaroğlu, "Socializing," 163–5.

[15] Liana Saif, *The Arabic Influences on Early Modern Occult Philosophy* (New York: Palgrave Macmillan), 4.

[16] See for instance, Maurice Crosland, *Historical Studies in the Language of Chemistry* (London: Heinemann, 1962), 29.

[17] Derek de Solla Price, "Geometrical and Scientific Talismans and Symbolisms," in *Changing Perspectives in the History of Science: Essays in Honour of Joseph Needham*, ed. Mikuláš Teich and Robert Young (Heinemann: London, 1973), 255.

juxtaposing geometric shapes). The image, inextricably connected to the representation of a scientific principle, comes to embody the entirety of the cosmic world, one with resonances in the magical and the esoteric realm. In the words of Derek de Solla Price, "the diagram tends to take on a life of its own."[18] As Chapter 3 illustrates, the eight-sided shape also becomes suffused with healing and apotropaic properties. In the diagrams of the *Kitāb al-diryāq*, one finds allusions to the image of the two intersecting squares, suggesting that the scribe was incorporating a cosmic connection in the geometric compositions. This abstract, cartographic representation of the cosmos is highlighted in diagrams 2 and 3 where the inner figure employs four diagonal line segments that intersect with the central geometric frame, often using repetitions of the same word (see Chapter 1 for diagram image and description). Similar representations of the cosmos are apparent in the horoscopic diagrams that chart the night sky in the form of diagonal subdivisions of the quadratic shape (see Chapter 3). Intersecting and repeating words are also evident within public monuments such as the hexagram in the mihrab of Sayyida Ruqayya in Cairo that signifies a cosmological outlook (see Chapter 5).

Form as a visual indicator of analogy is not always an end in itself. In other words, such visualizations of the cosmos in the medieval period are often paired with a philosophical or a metaphysical component. The diagrams often become the means to dwell on and explicate larger philosophical questions. One domain in which such representations flourished was that of alchemy. Like the perfection of the human body achievable through the perfect balance of the four humours, alchemy similarly sought to achieve the perfect metal by discovering the right balance of elements. The image of the two intersecting squares discussed above, is also present in alchemical treatises to highlight the elements and their properties. Alchemy has a close

[18] Price, "Geometrical," 252.

relationship with medicine, one of its quests being the formulation of the elixir—a drug designed to cure the body of all ailments.[19] Treatises attributed to Jabir ibn Hayyan, the famed alchemical figure, utilize cosmological diagrams to illustrate the workings of his alchemical experiments that functioned in tandem with the celestial rotations and movements (see Chapter 4). As discussed in Chapter 4, the circular diagrams are labelled as "*shakl*" or "*da'ira*" and the nature of the drugs identified as "*marṭaba*"—all of the terms also incorporated in the diagrams of the *Kitāb al-diryāq*. The end goal of the alchemical experiments, the elixir, had medicinal properties that were described as healing for the very sick; however, the elixir has always been confined to the realm of the occult, and is touted for its miraculous and wondrous qualities.[20] In this regard, the elixir is analogous to the theriac, in its mysterious nature and its intricate composition.[21] The circular diagrams of the *Kitāb al-diryāq* (diagrams 7 and 9), like the cosmological figures of Jabir ibn Hayyan, use geometric form to identify with the cosmos. Both the circular concentric figures of the theriac recipes employ seven layers of script, which an educated reader might have instantly connected with the seven concentric circular rotations of the planets. By presenting the recipes in this way, particularly the final iterations of the theriac using the cosmos as a model, the scribe is implanting the recipe with a sense of perfection in a manner found only in the perfection of the universe. In doing so, *muḥākāt* (that is, creating correspondences) is not only an element of the final representation—that the diagram visually resembles cosmic representations—but also integral to the process. The process of *muḥākāt* can be observed on three different levels: the physical medicinal electuary, the theriac, operates in the manner of the

[19] For an overview on this topic, see Regula Forster, "Alchemy," in *Encyclopaedia of Islam*, Third Edition, accessed November 8, 2021, http://dx.doi.org/10.1163/1573-3912_ei3_COM_23831. For alchemy in Late Antiquity, see Owsei Temkin, "Medicine and Graeco-Arabic Alchemy," *Bulletin of the History of Medicine* 29 (1955): 134–53.

[20] Temkin, "Medicine," 145.

[21] Temkin, "Medicine," 141.

cosmic operation; the visual diagram comprising of a series of concentric circles imitating cosmic rotations; and the scribe's own process of creating the diagrams aligns himself to the greatest physician, Galen, as well as to God, the creator of the universe. This process of cosmic *muḥākāt* underscores the idea that similar to the mysterious workings of the cosmos, there was an element of mysteriousness to the working of the theriac. Analogous to the elixir, the theriac operated through hidden or occult forces and was therefore represented in a similar way; that is, through the most perfect of shapes, the spherical figure (for the circle as the perfect shape, see Chapter 4).

The diagrammatic representations were also utilized to manifest visually the relationship between the source and its reproduction. The connection between the intelligible world and the corporeal world, the celestial and the terrestrial, the macrocosm and the microcosm is particularly prominent in Neoplatonic philosophy.[22] This strand of philosophy was prevalent in Late Antique Alexandrian schools of medicine and permeates medieval Islamic thought and esoteric branches (see also Chapter 4).[23] The *Kitāb al-diryāq*'s alleged association with Late Antique medical schools and more generally, the widespread practice of this philosophical strand in Islamic thought,[24] suggests that visual models of the cosmos were not merely decorative and aesthetic embellishments of the treatise; rather, the philosophical outlook suggests that the metaphoric representations served as a way to make palpable the intelligible world model. In the

[22] For its application in alchemy see Barbara Obrist, "Visualization in Medieval Alchemy," *HYLE International Journal for Philosophy and Chemistry* 9, vol. 2 (2003): 131–70, accessed March 2, 2020, http://www.hyle.org/journal/issues/9-2/obrist.htm#n78.

[23] For Neoplatonic philosophy and medicine in Late Antique Alexandria, see Owsei Temkin, "Studies on Late Alexandrian Medicine I, Alexandrian Commentaries on Galen's 'De Sectis ad Introducendos,'" *Bulletin on the Institute for the History of Medicine* (1935): 405–30.

[24] For Neoplatonic philosophy in medieval Islamic thought and paintings see Persis Berlekamp, *Wonder, Image and Cosmos in Medieval Islam* (New Haven and London: Yale University Press, 2011), 15–22.

writings of the *Rasā'il*, known for its Neoplatonic stance, the artist is encouraged to imitate/resemble God: "Know, my brother, that the dexterity in every craft (*ṣan'a*) consists of imitating (*tashbīh*) the Wise Maker; namely, the Creator, exalted be His Glory."[25] Emulating God in this way, claims the *Rasā'il*, serves as a pathway for a closer relationship with God. Thus, the diagrammatic metaphors of the *Kitāb al-diryāq* are visualizing the medicinal world order on the basis of the cosmic world order, with the scribe simultaneously using the calligraphic craft as a means to access God. In the esoteric treatises of the Kabbalah, also operating within the Neoplatonic framework, the cosmological diagrams are similarly interpreted as providing the scribe with an avenue for thinking and a reflection of their mental realities.[26] The relationship between an intelligible source and mental images is formative in Neoplatonic theories of knowledge, an idea discussed in the *Rasā'il* as well. The *Rasā'il* illustrates that the visuals produced by the craftsmen are indeed a product of a mentally-conceived image, one that is aided by God: "We therefore say that the practical craft consists of externalizing the form (*ṣūra*) that the knowledgeable maker has in his mind by positing it in matter."[27] The dissemination of Neoplatonic thinking, particularly across esoteric and magical modes of articulation, means that such models as products of imaginative constructions abound in those treatises and have even been asserted by al-Buni as the source of his circular diagrams (see Chapter 4). However, these

[25] Ikhwan al-Safa, *On Composition and the Arts: An Arabic Critical Edition and English Translation of Epistle 6–8,* ed. and trans. Nader El-Bizri and Godefroid de Callataÿ (Oxford: Oxford University Press in association with the Institute of Ismaili Studies, 2011), 157.

[26] Visualizations of the cosmos in Jewish mystical treatises begin to appear from the twelfth and thirteenth centuries. For a discussion of the role of the diagrams, see Marla Segol, *Word and Image in Medieval Kabbalah* (New York: Palgrave Macmillan US, 2012): 1–20. For diagrams and Jewish mysticism, see Brian Lancaster, "On the Relationship between Cognitive Models and Spiritual Maps: Evidence from Hebrew Language Mysticism," *Journal of Consciousness Studies* 7, no. 11–12 (2000): 231–50.

[27] Ikhwan al-Safa, *On Composition*, 140.

ideas are not confined to the realm of the occult, as "making" as a marker of intelligence and mimetic processes can also be observed in medieval Islamic portable objects more generally.[28]

6.2 Diagrams as Wonder

> It [the theriacal electuary] is of utmost wonder (*ghāyat al-ʿajāb*) and excellence (*al-jawda*).
> *Kitāb al-diryāq (diagram 7)*

As part of the rectangular framing inscription in diagram 7, the scribe explicitly refers to the theriac as an object of the highest wonder (*ghāyat al-ʿajāb*) and of excellence (*al-jawda*) (see Appendix, page 65 for a complete translation of this full-page diagram). This sense of wonder of the theriac has been iterated by the scribe on several occasions within the treatise. For instance, after the textual description of Proklos' theriac recipe, the scribe writes: "It [the composition] is of the utmost perfection/precision (*ghāyat al-aḥkām*)" (Appendix, page 16). However, diagram 7, being the culmination of theriacal developments, is the first time that the miraculous nature of the theriac has been included as part of a diagram—forming the final closing phrase of the quadratic inscription that visually seals the recipe. The rectangular frame circumscribes a circular enclosure, presenting a circle-in-square image to evoke the theriacal wonder of the verbal text. Juxtaposing the two shapes in this manner recalls the diagrams in the scientific manuscripts that use spatial forms to depict alternate perspectives of the imagining the world, such as the wind diagrams or cartographical representations that deploy rectangular and circular structures (see Chapter 2). The scribe has made considerable effort to emphasize the circular form through reinforcing the outermost circle: the use of emboldened script; elongation of the ligatures along the arcs of the circle; and the stretching and interlacing of the vertical letter segments. The two-

[28] See Margaret Graves, *Arts of Allusion: Object, Ornament, and Architecture in Medieval Islam* (Oxford, New York: Oxford University Press, 2018), 26–58.

part apotropaic text (auspicious beginning; blessed ending) employed in this circular enclosure is also of significance, adding an additional layer of sealing for the wondrous theriac—wording prominent in the magic-medicinal healing bowls of this period (see Chapter 4). The visual and textual prominence of the rectangular and circular frames invites the viewer/reader to perceive both forms, using the juxtaposition to also visualize the otherworldly or magical nature of the theriac. The cosmic significance of the two shapes in also particularly evident in numismatics from the Jazira region that combine the square and circle image to elevate the role of the ruler or a sacred image (see Chapter 5). By visualizing the recipe in this manner, not only the theriac as a physical electuary, but also the diagrams—as visual manifestations of the theriac—become objects of wonder. The diagrams of the *Kitāb al-diryāq* may therefore be understood from the perspective of the wonder (*'ajab*) genre.

The dictionary definition of *'ajab* is "wonder, i.e. strange, extraordinary, or improbable."[29] When paired with becoming good, as in the word *al-jawda*, *'ajab* indicates admiration and visual pleasure.[30] Wonder has a rich philosophical and global history that intertwines aesthetics, emotions, intellectual engagement, and spiritual inquiry.[31] In medieval Arabic philosophy and aesthetics, *'ajab* plays a crucial role and is exploited in both the visual and the verbal arts.[32] One of the most well-known anecdotes on *'ajab* comes from the *Khiṭaṭ* of al-Maqrizi, the fifteenth-century historian, where images of women appearing and

[29] Edward William Lane and Stanley Lane-Poole, *An Arabic-English Lexicon* (Beirut: Librairie du Liban, 1980), 1956.

[30] Lane and Lane-Poole, *An Arabic-English,* 1956.

[31] For a general overview of wonder see Philip Fisher, *Wonder, the Rainbow, and the Aesthetics of Rare Experiences* (Cambridge, MA: Harvard University Press, 1998).

[32] For wonder in medieval Islam, see Berlekamp, *Wonder,* 22–6. For wonder in the verbal arts see Harb, *Arabic Poetics*, 75–134.

disappearing—a play on light, shadow, and visual movement—were characterized as "wondrous (*'ajab*)" in a painting contest at the Fatimid court.[33] In visual discussions of wonder, emphasis is placed on the images to engender motion and movement. Speaking of an "aesthetic of *'ajab*," in Abbasid Baghdad, Matthew Saba advocates that artists induced wonder through the "illusion of movement" and strategies that render the image as being "alive."[34] Movement and wonder are therefore intimately linked in the visual arts of the period. As the *Kitāb al-diryāq* diagrams are designed as wonder-producing images, they might also be culturally read as alive and three-dimensional entities. The element of motion is highlighted in the performance of the script to produce patterns. Chevron patterns are created in the listing of drugs, simply by means of inscribing text in diagonal planes (see figs. 1.9 and 1.10). The more complex circular and square compositions play with script through internal subdivisions or in the form of framing to create aesthetically striking images, each of which sets the viewer's gaze in motion. In its production and consumption, the diagrams must be physically or visually manipulated for a complete reading. As the viewer engages with the diagrams, they either physically turn the manuscript, move themselves around, or mentally imagine the reading. Movement is also represented by creating a sense of depth through contrasting colours in the diagrams, an idea narrated in al-Maqrizi's account that produces a more "wondrous" image. In the *Kitāb al-diryāq*, the interplay with black and red provides an internal rhythm as the viewer navigates through the many layers within the diagrams.

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[33] The anecdote is cited in Nasser Rabbat, "'Ajīb and Gharīb: Artistic Perception in Medieval Arabic Sources," *The Medieval History Journal* 9, no. 1 (2006): 101–2. A narrative from the *Rasā'il* similarly illustrates a competition of sorts, where one painting was considered more wondrous (*'ajīb*) by the viewers than the other images because of the artist's ability to visualize movement within the painting. The tenth-century historian, Ma'sudi, describes the Indian peacocks as having a "wondrous quality (*shay' 'ajīb*)" when speaking of their multi-coloured feathers and their "wavelike motion." See Matthew Saba, "Abbasid Lusterware and the Aesthetics of *'Ajab*," Muqarnas 29 (2012): 198–201.

[34] Saba, "Abbasid," 202.

Interactions of motion between the viewer and the art object—in particular, with respect to the geometric script patterns—are one of the key elements in the visual vocabulary of magic. As observed in Chapters 3–5, the use of quadrilateral and circular enclosures, and the movement of line and script in a variety of directions created dynamic objects that were capable of performative action—often referred to as objects of wonder. For instance, magic squares described in the earliest medical treatise employ identical language, referring to them as *shay' 'ajīb*, that is, something wondrous (see Chapter 3). However, the objects are wondrous not only because of their connection to the supernatural world, but also because they elicit a visual sense of movement, most apparent in the movement of words in encircling, interlacing, and diagonal trajectories—they catch one's attention through their intricate craftsmanship and offer visual pleasure just as the pages of the *Kitāb al-diryāq* do. Movement associated with such objects is often echoed in physical movements of the human body, such as instructed in the Greek Magical Papyri where the individual must move around in a circle while reciting the incantations (Chapter 4). In Late Antique mosaic floors and Byzantine church walls, the placement of script in circular arrangements infuses life and dynamism into the image, providing visual pleasure and inviting movement. Similarly, the encircling inscriptions on tombstones and cenotaphs in the Islamic world encourage circumambulation of the objects. In fact, urban spaces celebrated for their healing and miraculous powers are also known as *'ajā'ib*—sites of wonder (see Chapter 5). Thus, movement, wonder, and magic appear inextricably linked in the medieval period (for magic and wonder, see also 6.3 below).

While theories on visual aesthetics are limited in medieval Islam, the nature and discourse on *'ajab* in the visual realm can, like mimesis, be also be understood from its

explication in poetics and literary theory.[35] At the turn of the eleventh century, Arabic literary theories and poetics were suffused with ideas of subjectivity, discovery, and pleasure that engendered a new paradigm, which Lara Harb calls "the paradigm of wonder."[36] Championed by ʻAbd al-Qahir al-Jurjani (d. 1078), the wonder paradigm builds on and challenges older Arabic poetics and Aristotelian binary structures of truthfulness and falsehood; in this new school the emphasis lies on creating emotional responses of wonder and astonishment through utilizing the element of the fantastic.[37] Poetic beauty is thus evaluated through an "internal logicality of an image" rather than with the "plausibility of an image," creating space for the rhetoric of *takhyīl*.[38] *Takhyīl* is described as "make-believe" imagery or "imaginative creation,"[39] that allows art to transcend physical and natural boundaries, and into the realm of the fantastic and the supernatural. This strategy of *takhyīl* in poetics allows for verbal imagery to elicit wonder. As such, wonder is intertwined with imagination and pleasure.[40] According to al-Farabi, "the intended purpose of make-believe speech (*takhyīl*) is to move the listener to do that which he was made to imagine about a given matter … whether the image that was evoked is true or not, and whether the matter in reality is as it was represented or not."[41] The manner in which *takhyīl* is

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[35] The term *ʻajab* in the visual realm is a device appropriated from the literary. See Rabbat, "ʻAjīb and Gharīb," 106.

[36] Harb, *Arabic Poetics*, 25–74.

[37] Harb, *Arabic Poetics,* 28–30.

[38] Harb, *Arabic Poetics,* 30.

[39] Harb translates it as "make-believe," and Necipoğlu as "imaginative creation." See respectively Harb, 45–6; and Gülru Necipoğlu, *The Topkapı Scroll: Geometry and Ornament in Islamic Architecture. Topkapı Palace Museum Library MS H. 1956* (Santa Monica, Calif., 1995), 213–4.

[40] See also Necipoglu, *The Topkapı Scroll*, 213–4.

[41] Abu Nasr al-Farabi, "Jawāmiʻ al-shiʻr (Kitāb al-shiʻr)," in *Talkhīs kitāb Aristutālis fī alshiʻr*, ed. Muhammad Salim Salim (Cairo: Matabiʻ al-Ahram al-Tijariyya, 1971), 175, translated in Harb, *Arabic Poetics*, 82.

described in Arabic literary criticism finds close parallels with mimesis (*muḥākāt*) discussed in the previous section. While the two terms (*takhyīl* and *muḥākāt*) have often been used synonymously in Arabic literature, scholars have interpreted the former to indicate the reception of the verbal image, that is, the viewer response; and the latter as the medium, or the image itself, through which the reception occurs.[42] It is this effect of *takhyīl* that Harb describes as evoking wonder and amazement for its audiences. This paradigm of wonder extended to philosophical inquiry in the eleventh century, reaching its apex in the works of the celebrated tenth-century philosopher, Abu ʻAli Ibn Sina (d. 1037).[43] Examining the *Kitāb al-diryāq* images from this vantage point of poetics and philosophy can explain the diagrams as an exercise in *takhyīl*, where the scribe's goal of eliciting wonder included a series of imaginative creations. Unlike the visual metaphors that in some way were meant to allude or compare to natural processes, from the perspective of *takhyīl*, the diagrams can be seen as new and original creations; while similar quadratic and circular diagrams of the theriac may be seen elsewhere (see below for theriac diagrams in other treatises), the aesthetic embellishment of script, geometry, movement, rhythm, and balance, all contribute to *takhyīl* in a visual sense, making the intricate diagrams equally unfamiliar and strange (*ʻajīb*) to the viewer—thus allowing the scribe to achieve his goal of evoking wonder. Wonder, within the diagrams, centers on this affective response of its audiences.

The importance of poetics and literary criticism becomes even more pronounced in the *Kitāb al-diryāq* as the theriac—and medicinal treatises more generally— is often composed in a poetic form. Early Greek treatises on poisons, *Theriaca* and *Alexipharmaca*, attributed to

[42] Harb, *Arabic Poetics,* 83.

[43] See Harb, *Arabic Poetics,* 88–95.

Nicander of Colophon (2nd C BC) are both poetic compositions.[44] The theriac of Andromachus is a poem comprising eighty-seven distiches.[45] The two treatises of Galen on antidotes, *De Antidotis* and *Ad Pisonem*, both present remedies in the form of poems.[46] In the *Kitāb al-diryāq* as well, the series of repetitions in tabular forms echo poetic meters and language (see fig. 1.7 for chronology of physicians; fig. 1.8 on quantities of drugs; see also Appendix, pages 24 and 11 for repetition of words and phrases). The composition of antidotes in this manner suggests the widespread dissemination of such knowledge; in that it was not restricted for the elite or the specialist, but constituted part of one's general knowledge—an idea discussed by Oya Pancaroğlu as "socializing medicine."[47] In addition to the poetic form, narrative illustrations in at least two known treatises of the *Kitāb al-diryāq* (BnF arabe 2964 and Vienna Österreichische Nationalbibliothek, A.F. 10) are ways in which toxicology is made palatable to its viewers. The social aspect of the antidotes extends to storytelling, where medical knowledge was incorporated in *adab* narratives aimed at the common man.[48] From this perspective, the theriac has a wider base audience that includes not only the physicians and the elite members of society, but equally the common man.

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[44] Martin Levey, "Medieval Arabic Toxicology: The Book on Poisons of Ibn Wahshiya and Its Relation to Early Indian and Greek Texts," *Transactions of the American Philosophical Society* 56, no. 7 (1966): 7–8.

[45] Françoise Micheau, "The Medicinal Value of the Book of Theriac," in *Kitāb al-diryāq (Thériaque de Paris), édition en facsimilé du manuscrit arabe 2964 de la BnF* (Sansepolcro: Aboca Museum, 2008-2009), 51.

[46] For Galen's treatises on poisons see Vivian Nutton, "Galen on Theriac: Problems of Authenticity," in *Galen on Pharmacology: Philosophy, History, and Medicine*, ed. Armelle Debru (Leiden ; New York: Brill, 1997), 131–51.

[47] Pancaroğlu, "Socializing Medicine," 155–72.

[48] For a description of such narratives see Julia Bray, "The Physical World and the Writer's Eye: Al-Tanukhi and Medicine," in *Writing and Representation in Medieval Islam: Muslim Horizons* (New York, N.Y: Routledge, 2006), 215–49.

In some later manuscripts, visualization of poetic verses implies a shared aesthetic base between poetry and art. In the *Baḥr el-ma'ārif (Sea of knowledge)* copied in 1585 for the Ottoman prince, script in circular configurations is employed to illustrate sound and meter (fig. 6.1a). Compositions in script also form square shapes with diagonal subdivisions, intersecting square figures, and radial patterns, all of which are designed to present poetry (fig. 6.1b). Given the use of script for its construction, the reader/viewer is able to both read the text as well as see the text—the diagrams mediating between the poetic essence and the audience's cognitive and affective experience. A similar series of script-compositions feature in a Persian anthology from Jaunpur (BL Or 4110), where quadratic, circular, and radial patterns are designed to visualize poetry (figs. 6.2a, b). The fifteenth-century Jaunpur anthology and the *Baḥr el-ma'ārif* exhibit strong visual resonances, suggesting that such an aesthetic of visualization was widespread across geographic spaces. The *Kitāb al-diryāq*, rooted in poetic constructions of the theriac recipe, employs geometric diagrams in a similar manner to evoke both literary and visual wonder through its diagrams. The scribe of the Paris manuscript was not unique in doing so, as subsequent iterations of the treatise also include script-based patterns. From the six extant manuscripts of the *Kitāb al-diryāq* (see Chapter 1 for details of additional iterations), at least three more copies include diagrammatic representations of the theriac. In the thirteenth-century treatise at the National Library of Vienna, which also includes narrative figural illustrations, a range of script diagrams are employed to highlight the drugs and their pharmacological effects. Some of the diagrams are identical in structure and composition to the Paris treatise, whilst others include ovoid formations, arcs, and star-shaped polygonal devices to visualize the recipes (figs. 6.3a–c). Another copy, dated to 1224–5 in a private collection, features replicas of the quadratic diagrams (figs. 6.4a–c). Even the fairly late copy, dated to the sixteenth century at the

National Library of Cairo, includes diagrammatic representations of the theriac recipe (figs. 6.5a, b). The nature of visualization in these copies is most resonant with the poetic representations of the Jaunpur anthology and the *Baḥr el-ma'ārif*—the theoretical framework of wonder underpinning their creation well-suited to examine the *Kitāb al-diryāq* representations.

'Ajab creations also operate within the realm of the supernatural and the metaphysical, eliciting mental, emotional, and spiritual responses from its viewers. According to some grammarians, *'ajab* "signifies the mind's becoming affected, or acted upon, by some excessive quality; …or it is [the wondering] at a thing of which the cause, or reason, is hidden, and not known."[49] Al-Qazwini (discussed in Chapter 2), the author of one of the most prominent treatises of the wonder genre, describes *'ajab* in a similar way: "the sense of bewilderment a person feels because of his inability to understand the cause of a thing."[50] In the visual arts, the *'ajab* genre was popularized by al-Qazwini's treatise *'Ajā'ib al-makhlūqāt* which explicates natural and created wonders. Persis Berlekamp interprets the wonder-images in the treatise as aesthetically pleasing objects that allowed for viewers to appreciate the images firstly with their eyes, followed by their internal senses and intellect, eventually leading to a consciousness of God as the creator of the wonders (see also next section for visual perception).[51] In this way, the mental, emotional, and spiritual realms collide, forming a continuum between the visible and the invisible, the natural and the supernatural.[52] In literary theory, verbal aesthetics also captured audiences affectively through imagination or *takhyīl*: "[Speech] which makes you imagine something is speech to which the soul yields, becoming attracted to matters and repulsed from

[49] Lane and Lane-Poole, *An Arabic-English Lexicon*, 1956.

[50] Berlekamp, *Wonder*, 23.

[51] Berlekamp, *Wonder*, 22.

[52] Berlekamp, *Wonder*, 18.

them, without examination, thought, or choice. In sum, [the soul] reacts to it in a way that is psychological, not rational."[53] The aesthetics of the period, particularly that relating to the wondrous and the imagination, may impact one's soul directly through affect. Al-Jurjani even goes so far as to say that *'ajab* changes the nature of the soul (*nafs*).[54] The idea of *'ajab* as transcending the intellect and into the metaphysical also explains the close connection between *'ajab* and magic (*siḥr*) and trickery (*ḥiyal*).[55]

The *Kitāb al-diryāq* as oscillating between the scientific and the popular, between poetry and art, between the imagined and the imaginary, is a paradigmatic illustration of the function of aesthetics in the medieval period; that is, evoking wonder through visual, intellectual, and spiritual inquiry. That the manuscript was created for an imam, a religious authority of Sunni or Shi'i denomination, further suggests that the *'ajab* diagrams were intended not only for visual pleasure; the imagined creations also worked mentally and affectively to bring one closer to God.

6.3 Diagrams as Magical and Talismanic

In the *Kitāb al-diryāq,* one of the reasons that the final theriac recipes of Andromachus the Younger and Galen are touted above all others is because of the addition of viper flesh. Not only are these recipes boldly illustrated (diagrams 7, 8, and 9), but the scribe also provides three different narratives in-text and through figural illustrations that highlight the discovery of the

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[53] Ismail M. Dahiyat, *Avicenna's Commentary on the Poetics of Aristotle: A Critical Study with an Annotated Translation of the Text* (Leiden: E.J. Brill, 1974), 24, quoted in Harb, *Arabic Poetics*, 89.

[54] Roy Mottahedeh, "'*Ajāib* in The Thousand and One Nights," in *The Thousand and One Nights in Arabic Literature and Society,* ed. Richard Hovannisian and Georges Sabagh (Cambridge: Cambridge University Press, 1997), 30.

[55] Emilie Savage-Smith, "Introduction," in *Magic and Divination in Early Islam*, ed. Emilie Savage-Smith (Aldershot: Ashgate, 2004), xxix.

viper flesh as a fundamental ingredient of counter poison (see Appendix, pages 22, 5, and 6). The phenomenon follows the theory of *similia similibus curantur,* that is, like has the power to cure like. Magical theories operate on a similar framework of "like counters like," offsetting the power of natural and supernatural beings with images of themselves.[56] As seen in Chapter 5, such examples abound in public spaces where the images were sites of prophylactic and apotropaic practices. A most pertinent example is the frontispiece of the *Kitāb al-diryāq*: the intertwined serpent-dragon motif functioning to ward off the serpents by taking the guise of it. The connection between zoology and demonology in this period means that the frontispiece can equally be interpreted as an apotropaic image, the knotted bodies repelling demons and negative forces more generally (see also Chapter 5 for such images in mosque settings). By re-presenting the serpent, the frontispiece illustrates a visual application of the "like counters like" theory. The theriac functions in an identical fashion, structurally aligning the physical electuary and the visual recipes within this magical worldview.

The second way in which the ontology of the theriac intersects with the magical world is its resonances with the magic square. In the *Rasā'il*, the magic square is considered magical primarily because of its "harmonious relationships (*al-nasab al-ta'līfiyya*)." By bringing together occult properties of numbers with the occult properties of geometrical figures in a harmonious way, the square becomes more than the sum of its parts; that is, it exponentially increases its level of potency, falling into the realm of the magical (see Chapter 3 for a detailed discussion on the workings of a magic square). The *Rasā'il* expounds on the magic square by providing analogies that operate through a similar mechanism. The theriac is one such analogy mentioned

[56] See Finbarr Barry Flood, "Image against Nature: Spolia as Apotropaia in Byzantium and the Dar al-Islam." *The Medieval History Journal* 9, no. 1 (2006): 153–4; and Persis Berlekamp, "Symmetry, Sympathy, and Sensation: Talismanic Efficacy and Slippery Iconographies in Early Thirteenth-Century Iraq, Syria, and Anatolia," *Representations* 133, no. 1 (2016): 69–70.

by the *Rasā'il* where harmonious drugs are similarly brought together in perfect proportions and thus are capable of healing a wide variety of illnesses—such a comparison is also an illustration of *muḥākāt* discussed above. That the *Rasā'il* used the example of the theriac to explain the functionality of the magic square (rather than the other way around) suggests that the mechanism of the theriac would likely have been common knowledge for an educated reader. If that were the case, then the reader viewing the *Kitāb al-diryāq* pages would have intuitive knowledge of the cosmological and astral connections implied within the treatise. Furthermore, the diagrams of the *Kitāb al-diryāq* are approached by the scribe through this magical worldview: the properties of the theriac are combined with the properties of the geometric shapes, and done so harmoniously. The reference to harmonious (*tā'alīf*) is verbally indicated in the diagram for the preparation of the pastille (Chapter 1, diagram 5) in the form of a caption heading. The double-page quadratic figure (Chapter 1, diagram 8) employs *tā'alīf* twice framing the innermost inscription, both times in reference to the diagram as a visual illustration of the harmony. The innermost inscription describes the mechanism of the theriac: "When the simple drugs are mixed, its composition will result in a different temperament and different benefits, which cannot be found in any one of the drugs [when used in isolation]," echoing the workings of the magic square (Appendix, pages 66 and 67). In Arabic literature more generally, *tā'alīf* is often found to indicate proportionality, beauty, and its metaphysical components.[57] This choice of words by the scribe suggests that the diagrams were intended and designed to conform in a harmonious fashion, thus increasing the efficacy and impact of the visual device.

[57] For a discussion on harmony and beauty, see Necipoğlu, *The Topkapı Scroll,* 185–189. For beauty, see also Valérie Gonzales, *Beauty and Islam: Aesthetics in Islamic Art and Architecture* (London: I.B. Tauris Pub. in association with The Institute of Ismaili Studies, 2001).

The magic square is articulated primarily as a visual structure, in that a square shape is transformed internally through a series of grids executed in the right proportions and in the right celestial settings. In doing so, the image transforms from a passive, two-dimensional entity, to one that is alive, capable of receiving astral powers, and has the ability to perform acts of healing. The magic square is active and has agency. Looking at the quadratic diagrams of the *Kitāb al-diryāq*, the visual resonance with the magic square is astounding (see Chapter 1, diagrams 1–6, 8). Given that the magic square and the theriac operate from an identical ontological framework, might the scribe have used the framework of harmonious proportions and its magical application in the *Kitāb al-diryāq* diagrams? The diagrams exhibit "harmonious proportions" through visual elements of balance and symmetry (see Chapter 1). The careful attention to symmetry and modularity within the figures is not intrinsic to the geometric shape, but a conscious action on the part of the scribe that visually enlivens the figures just as the internal additions that transform a square into a magic square.[58] In fact, visual balance often takes precedence over textual contents, as seen in several pages of the *Kitāb al-diryāq* (figs. 1.7 and 1.12). The repetition of this strategy in various places in the manuscript obviates interpretations of diagrams as mnemonic devices; rather, the harmonious proportions illustrated in the listing of the drugs and its compositions, as well as in the visual representation of them, perform like the magic squares. In this way, the quadratic diagrams might be interpreted as "alive," possessing agency, and capable of acts of healing. The diagrams become magical—even talismanic given the astrological associations of the treatise.

[58] Marcus du Sautoy, *Symmetry: A Journey into the Patterns on Nature* (New York: Harper Perennial, 2008), 6.

The parallels between the magic square and the diagram of the theriac can also be seen in practice. Magic squares are a common occurrence as part of the visual repertoire of the magic-medicinal bowls, particularly in the twelfth and thirteenth centuries (see Chapter 4). In his *Book on Poisons and the Protection Against Lethal Drugs*, Moses Maimonides (d. 1204) speaks of the scholar Abu Marwan b. Zuhr (d. 1161) who "… whether on the road or the home, he would always have at hand a silver bowl containing the great theriac and a piece of emerald, because he felt, may God have mercy on him, very suspicious about deadly poisons."[59] No such bowl with the theriac has come to light. However, one might imagine that the theriac on the silver bowl would have been engraved and likely taken a visual form.[60] The implication is that the bowl with the theriac would have been sufficient prophylaxis for Abu Marwan; the physical theriac need not be consumed. In this way, the theriac image functions in the same way as the magic square engraved on the bowl; that is, they both operate through the medium of the visual image. In the medical treatise, *Kitāb al-mughnī fī al-ṭibb* of Abu'l-Hassan Sa'id b. Hibat Allah (d. 1101), one can see a similar magical application of the theriac diagram (BL Or 3645, c. 1139). The manuscript is prefaced by a series of flyleaves, in Persian, that are likely added post-production (folios 1–3). These flyleaves include quadratic diagrams identical to the initial two recipes seen in the *Kitāb al-diryāq*, including the inscription of the drugs along the four vertices, the diagonal use of script inside the shape, and the encircling border of framing text (fig. 6.6). The images indicate that such diagrams of the theriac were not unique to the Paris *Kitāb al-diryāq*. Their addition to the *Kitāb al-Mughnī* as a prefatory interface instead speaks to the images acting as a

[59] Moses Maimonides, *On poisons and protection against lethal drugs*, ed. and trans. Gerrit Bos (Provo: Brigham Young University Press, 2009), xxxi.

[60] From the quote, I assume the author speaks of a visual theriac. The actual, physical antidote is generally in the form of a syrup or electuary and could not have been carried in a bowl.

layer of protection for the treatise, in a manner resembling additions of magic squares and invocations of *kabīkaj* in medieval manuscripts—the latter to guard against worms and insects.[61]

Both the circular diagrams of the *Kitāb al-diryāq* (diagrams 7 and 9) include the word *shakl* as a label for the geometric images.[62] The word appears as part of the outermost quadratic composition that frames the diagrams. *Shakl* is defined as "shape; form; aspect" and can also be used to indicate "likeness; resemblance; match."[63] In the second treatise of the *Rasā'il*, *shakl* is used predominantly to describe geometric shapes. Building on Euclid's *Elements*, a surface is defined in the *Rasā'il* as "a figure (*shakl*) that is surrounded by a single line or multiple lines." A circle then "is a figure (*shakl*) that is surrounded by a single line."[64] Polygons or rectilinear figures (*al-ashkal al-mustaqīma al-khutūt*) also include the word *shakl* in their description: a triangle is referred to as *al-shakl al-muthallath* and a square as *al-shakl al-murabba'* and so forth.[65] This section of the treatise also diagrammatically illustrates the geometric figures, using the terms *ṣūra*, *mathala*, or *mithāl* to indicate its visual representation. After describing the properties of the various geometric forms, the *Rasā'il* speaks of how the shape, when paired with numerical elements, exhibits properties that would not otherwise be sustainable; that is the whole

[61] Adam Gacek, "The use of '*kabīkaj*' in Arabic manuscripts," *Manuscripts of the Middle East* 1 (1986): 49–50.

[62] A recent article that examines the diagrams of the Paris *Kitāb al-diryāq* was published after the completion of this study. In the article, the author interprets all of the diagrams in the manuscript with the label of *shakl*. As the term *shakl* was incorporated specifically for the circular diagrams and not for any of the rectangular compositions, I contend that the term *shakl* be reserved only for the former. See Meekyung MacMurdie, "Proven Recipes: Geometry and the Art of Arabic Medicine," in *The Diagram as Paradigm: Cross-Cultural Approaches*, ed. Jefferey Hamburger, David Roxburgh, and Linda Safran (Washington, DC: Dumbarton Oaks, 2022), 350–55.

[63] Lane and Lane-Poole, *An Arabic-English Lexicon*, 4: 1586–8.

[64] Ikhwan al-Safa, *On Arithmetic and Geometry: An Arabic Critical Edition and English Translation of Epistle 1&2,* ed. and trans. Nader El-Bizri (Oxford: Oxford University Press in association with the Institute of Ismaili Studies, 2012), 117.

[65] Ikhwan al-Safa, *On Arithmetic*, 118.

is greater than the sum of its parts. This ontological framework has been discussed in Chapter 3, where the treatise uses the word *shakl* again to indicate the magic square, *al-shakl al-mutassa'* (the nine-slot figure). The term *shakl* as incorporated in the *Rasā'il* then is in clear reference to a geometric form. That form, however, may very well have magical properties particularly when in combination with harmonious proportions. In the *Firdaws al-ḥikma* (discussed in Chapter 2), the scribe uses *shakl* in two different contexts; in both instances, the word refers to a geometric shape. In the first instance, the term *shakl al-saṭar* (lined figure) forms the title of an 8x9 table (see Chapter 2 for a discussion on the tabular form). The accompanying text above the table incorporates the words: *hadha ṣūra shakl al-saṭar* (lit: this is a figure image of lines). The scribe has included the word *shakl* here for no other purpose than to indicate the geometric nature of the tabular form. The sentence may be better translated as: this is a geometric image of lines. In the same treatise, the author has employed *shakl* to denote the magic square, using the word independently without any modifiers (see Chapter 3) and *ṣūrat al-shakl* when referring to the magic square diagram.[66] Thus, it is the context in which the term is used that provides the semantic meanings and associations.

In the ophthalmological treatises discussed in Chapter 2, in all cases *shakl* is used to describe the quadratic geometric shape that follows. The cosmological treatise of the *'Ajā'ib* employs the term *aflāk wa ashkālahā* more specifically to visualize the geometric nature of the planets and the stars. Jabir ibn Hayyan's cosmological diagrams employ the words *ṣūrat al-shakl* (image of the shapes); in this case the emphasis on the geometric form (*shakl*) is analogical, that is, connecting the visual to the celestial. The nuances of the word are seen in the writings of Abu

[66] BL Arundel Or 14. For a transcription and translation See Bink Hallum "New Light on Early Arabic Awfāq Literature," in *Islamicate Occult Sciences in Theory and Practice*, ed. Liana Saif, Francesca Leoni, Matthew Melvin-Koushki, and Farouk Yahya (Leiden: Brill, 2021), 73–4.

Hamid al-Ghazali (d. 1111), who speaks of *shakl al-ṣuwar* (shapes of images) in reference to utilitarian objects that were shaped in the manner of images.[67] By employing *shakl* as a modifier, the resulting image that al-Ghazali is referring to becomes three-dimensional and thus alive. In Abu Rayhan al-Biruni's (d. 1048) treatise on the *Chronology of Ancient Nations*, a combination of *shakl* and *ṣūra* feature as a caption to a diagram of a horoscope, illustrated in the form of a rectangle: *shakl hadha al-ṣūra* (shape of this image; fig 6.7).[68] In this instance, *shakl* is in reference to the geometric nature of the image, in that the visual image takes the form of a four-sided figure. However, if Ghazali's definition were to be used to articulate the image in al-Biruni's treatise, then the caption may be read as a three-dimensional image of the night sky. That the image represents the position of the celestial bodies, the geometric form (*shakl*) visually and metaphorically embodies harmonies and celestial proportionalities. As such, thinking about the image from the point of view of the *Rasā'il* would qualify the image to be more than a combination of lines and angles; that is, the image has properties beyond this visual representation. Such instances of *shakl* feature in magical and esoteric materials, where the geometric form was imbued with capabilities that extended beyond the physical realm: the thirteenth-century geomantic device uses *shakl* to refer to geomantic figures that are circular in form; al-Buni has incorporated the descriptor to label the diagrams that are capable of harnessing celestial forces, particularly the concentric figures (see Chapters 3 and 4). In the *Laṭā'if al-ishārāt*, in addition to using *shakl* in reference to the diagrams, al-Buni describes how such figures (*shakl*) function.[69] It is important to note that not all the figures (*shakl*) in the treatise are

[67] Graves, *Arts of Allusion*, 61–2.

[68] Manuscript copy dated to 1371. Edinburgh University Library, Or. Ms. 161, f. 127v.

[69] BnF arabe 2657.

closed geometric shapes. For the figure of the letter *alif* (fig. 6.8), the treatise reads: "this is the figure (*shakl*) of the *alif* and how God arranged it in all parts of the cosmos … Whoever realizes what is in its hidden and apparent essence will ascend to the rank of the heirs [of the prophets]."[70] In the same treatise, the "figure and image" (*shakl* and *ṣūra*) of the letter *rā'* (fig. 6.9) is accompanied by more detailed instructions: "He who meditates upon the secret of *rā'* and how God disposed its inscription in the tablet-world will witness the marvels (*'ajā'ib*) of the handiworks of God and discover the secret of the spirit (*sirr al-rūḥ*)."[71] The text illustrates that the *shakl* itself embodies the "essence" and the "secret," the form of the celestial forces intertwined with that of the Arabic letters. The *shakl* of the *rā'* in particular appears closest to the *shakl* of the *Kitāb al-diryāq* compositions (diagrams 7 and 9) for several reasons. First is the use of script to frame the circular image. This framing is emphasized not only in the form of a diagram illustrated in the treatise (as seen in fig. 6.9) but also in the prose text that specifies "this figure and image, with the verses [written] above the image in a circle around it"—the sentence recalling the detailed instructions of the Greek Magical Papyri (see Chapter 4). Second is the identical terminology employed in the instructions of the *rā' shakl* to the *Kitāb al-diryāq shakl*. Words such as "*'ajāb*" and "*rūḥ*" (the latter discussed in detail below) in the diagrams of the *Kitāb al-diryāq* suggest that the *shakl* (or diagrams) in the treatise were perhaps more than just geometric figures in the manner that the scientific treatises (discussed in Chapter 2) employ them. I argue that their visual and linguistic affinities with the magical realm suggest an interpretation closer to talismanic images.

[70] Translation from Noah Gardiner, "Esotericism in a manuscript culture: Ahmad al-Buni and his readers through the Mamluk period," PhD diss., (University of Michigan, 2014), 221.

[71] Gardiner, "Esotericism," 223.

The final *shakl* of the *Kitāb al-diryāq* (diagram 9) featuring the theriac of Andromachus the Younger/Galen in concentric circles is framed by a quadratic inscription that describes Andromachus as *amīn al-arwāḥ* (guardian of the spirits).[72] By including the term *arwāḥ* (sing. *rūḥ*), the scribe is acknowledging the role of the hidden world in the realm of healing. This role was not uncommon in the practice of medicine or magic, and usually appears at the intersection of the two. The magic-medicinal bowl of Nur al-Din Mahmud ibn Zangi is a paradigmatic example that illustrates numerous parallels with the theriac diagram (see Chapter 4). Like the theriac, the therapeutic range of the magic-medicinal bowl is vast, with particular emphasis on poisons of serpents and scorpions. The curative properties of the bowl extended to protection from malicious spirits (*arwāḥ*), indicating that they were just as likely to be responsible for ill health. That the theriac is touted as an all-encompassing antidote, the mention of spirits suggests that it may have very well functioned like the magic-medicinal bowl, that is, in a magical capacity. The mention of Andromachus as not just *al-ḥakīm* (physician/sage) but as *amīn al-arwāḥ*, elevates Andromachus to the position of a saint or a deity. The fact that this phrase is part of the quadratic frame can be traced to magical materials from Late Antiquity (see Chapter 3). The incantation bowls from Mesopotamia and the Greek Magical Papyri serve as interesting comparison materials that similarly use the name of the spiritual entity as part of the geometric frame to physically enclose and protect the contents, the name itself embedded with the power to conquer and guard (see Chapter 4). This visual pattern of framing that which is deemed to be prized and sacred is a strategy copiously utilized in magical materials, serving as a device for visual prominence as well as acting as a barrier that prevents malicious spirits from accessing the framed subject. The enclosing shape binds the two component parts together; in the instance of

[72] See Chapter 1 for a full reading of the inscription and the diagram.

the theriac diagram, the name of the elevated Andromachus, one who is under God's mercy, is physically bound to the theriac recipe with the power of his name attached to the composition (see also Chapter 5 for binding of name and protective verses in public spaces). A variant reading of the term *shakl*, which in Edward Lane's lexicon is also defined as "binding, or shackling a beast," reinforces this element.[73]

Paired with the visual framing, the contents of the rectangular inscription in diagram 9 also find resonances in magical incantations and protection-seeking phrases (see Chapters 3, 4, and 5). The complete frame reads: "the dry drugs in this composition/diagram (*shakl*) and in the pastilles are sixty-six. And this theriac is attributed (*mansūb*) to the physician/sage (*al-ḥakīm*), guardian of spirits (*amīn al-arwāḥ),* Andromachus, to whom may God, praise be to God, extend his forgiveness and mercy." The inscription provides a brief description for the diagram, with the remainder focusing on a prayer or an invocation for Andromachus. Such linguistic compositions were characteristic of Late Antique church decoration, where prayers inscribed for the saints were boldly displayed as circular frames (see Chapter 5). The roundel at the Propylaea Church is worth mentioning here both for its intricacy of composition as well as its inscriptional content in a circular arrangement, part of which reads: "Guard my soul, for it is yours. Save your servant, O God, who hopes in you. Have mercy on my Lord, for I have called to you the whole day long."[74] The highly ornate and intricate apotropaic motif is framed by the inscription that calls on God for protection of one's soul, that which supersedes the protection of the body. The scribe of the theriac diagram builds on such ideas both visually through the frame, as well as the content he

[73] Lane and Lane-Poole, *An Arabic-English Lexicon*, 4: 1586–8.

[74] Sean Leatherbury, *Inscribing Faith in Late Antiquity: Between Reading and Seeing* (New York: Routledge, 2020), 249–50.

employs, wherein God and the hidden world (magical/spiritual) are the apex of healing. In other words, the scribe is drawing attention to God, as one who has ultimate authority over all healing. This element of hierarchical healing sits comfortably within the Neoplatonic framework that abides by the theory of emanation (see Chapter 4 for Neoplatonism).

The choice of *arwāḥ* (sing. *rūḥ*) may be further articulated through the lens of esoteric intellectual culture. The term *rūḥ* is often discussed and distinguished from *nafs*, the latter translated as soul. *Rūḥ* is predominantly translated as spirit, though soul is common as well.[75] In the Qur'an, *rūḥ*, particularly in conjunction with *amīn*, is used in reference to the angel Gabriel: "the Trustworthy Spirit (*al-rūḥ al-amīn*; i.e. Gabriel) has brought it down" (Q26: 193). On another occasion, the term *rūḥ al-quds* (the holy spirit) also identifies Gabriel.[76] In both instances, *rūḥ* is inextricably connected to the angelic realm. Other contextual settings of *rūḥ* appear as a category separate from angels, relating the idea more to divine inspiration.[77] The deliberate elusiveness of the term is signaled in the Qur'an: "[Prophet], they ask you about the Spirit. Say, 'The Spirit is part of my Lord's domain. You have only been given a little knowledge'" (Q17: 85). *Rūḥ*, therefore, belongs within the realm of God, and may be manifested in the celestial world as part of angels or in the terrestrial world as part of bodies, as in the narratives of Adam and 'Isa ibn Maryam illustrated in the Qur'an.[78] However, *rūḥ*, when used within the Qur'an, only appears in the singular form. Its plural form (*arwāḥ*), as inscribed in the *Kitāb al-diryāq*, is a term more commonly discussed in occult and esoteric sources. The tenth-

[75] For a discussion of *rūḥ* as spirit, see E.E. Calverley and I.R. Netton, "Nafs," in *Encyclopaedia of Islam,* Second Edition, accessed November 6, 2020, http://dx.doi.org/10.1163/1573-3912_islam_COM_0833.

[76] *Rūḥ al-quds* is used four times in the Quran: 2:87; 25:3; 5:110; 16:102.

[77] Q42: 52; 97:4; 16:2 (the last two relating to the verses on the Night of Power).

[78] Oliver Leaman, ed., *The Quran: An Encyclopaedia* (London and New York: Routledge, 2006), 436.

century bibliographer, Ibn al-Nadim, in his *Fihrist* identifies *arwāḥ* as a class of being separate from the angels and the jinn, yet functioning in an identical manner: "The exorcists and magicians (*al-muʿazzimūn wa al-saḥara*) assert that the devils, jinn and spirits (*al-shayāṭīn wa al-jinn wa al-arwāḥ*) obey and serve them, being directed by their own command and their prohibition… This invocation is addressed to Him [God], and oaths by the spirits (*arwāḥ*) and devils are by His help."[79] This idea of malicious spirits is echoed in the magic-medicinal bowl discussed above.

Treatises discussing astrology and astral magic on the other hand, conceptualize the world of spirits (*al-ʿālam al-arwāḥ*) as a category unrelated to the jinn or the devils. Such is the case in the writings of the *Rasā'il* and the *Ghāyat al-ḥakīm* (Picatrix), both written in the tenth century, which explicate spiritual beings (*rūḥāniyyāt*) as the powers present in the celestial bodies that have the ability to influence the terrestrial world.[80] The *rūḥāniyyāt* are active agents with their own volition, not perceptible through human sensation.[81] By virtue of their mediation, the *rūḥāniyyāt* occupy the spaces between God and the terrestrial world. The idea of the *arwāḥ*/*rūḥāniyyāt* stems from the Pseudo-Aristotelian Hermetic corpus, where the *Sirr al-asrār (Secret of Secrets)* similarly explicates the power of the celestial force on the terrestrial world, particularly in the creation of talismans for snake and scorpion bites.[82] In the *Ghāya*, the efficacy of recipes and concoctions is attributed to the *rūḥāniyyāt*, as they can "perform wondrous acts"

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[79] Savage-Smith, *Magic and Divination*, 91.

[80] Liana Saif, "From *Ghāyat al-Ḥakīm* to *Shams al-Maʿārif*: Ways of Knowing and Paths of Power in Medieval Islam" *Arabica*, no. 64 (2017): 306–7.

[81] Saif, "From *Ghāyat al-ḥakīm*," 306.

[82] Saif, "From *Ghāyat al-ḥakīm*," 307. See also the terms *arwāḥ* and *rūḥāniyyāt* as used by Fakhr al-Din Razi (1149–1209) in his *Kitāb al-sirr al-maktūm* (*The Book of the Hidden Secret)*, cited in Charles Burnett, "Thabit ibn Qurra and the Harranian on talismans and the spirits of the planets," *La Coronica* (2007): 13–40.

by operating through the natural properties of the drugs. In other words, the *rūḥāniyyāt* are responsible for the healing effects of the drugs. According to the *Ghāya*, "talismans are the most powerful choice for attracting a *rūḥāniyya*."[83] A "wise man" can harness the *rūḥāniyyāt* to "strengthen and inspire him and open the gates of wisdom" and was instructed to enter "into covenants with this *rūḥāniyya* by prayer and names." If the *arwāḥ* mentioned by the scribe of the *Kitāb al-diryāq* is in reference to the *al-ʻālam al-arwāḥ* and the *rūḥāniyyāt* as described in the magical treatises, then the astral connection in the treatise may be further strengthened. Andromachus, as the guardian of the celestial, spiritual beings (*arwāḥ*), in addition to the composition of the recipe, can also mediate the world of spirits that were ultimately responsible for the efficacy of the theriac. The prayer for Andromachus suggests that the physician acted as an intermediary between God and the terrestrial world, the space occupied by the *rūḥāniyyāt*. That the spirits had agency means that they needed to be manipulated in order to ensure the success of the theriac and Andromachus serves in that capacity. From this occult perspective, the diagram created by the scribe of the *Kitāb al-diryāq* may be seen as a talisman, one that attracts the *arwāḥ* by invoking their name, that of Andromachus as their guardian, and God as the ultimate source of all power. In the Sufi context, the writings of Muhyi al-Din b.ʻArabi also discuss higher spirits (*arwāḥ ʻulwiyya*), though their ontological nature is conceptualized slightly differently than that of the *Rasā'il* and the *Ghāya*.[84] The *arwāḥ* of Ibn ʻArabi are equated to the *rūḥāniyyāt* of the *Rasā'il* and the *Ghāya*, that is, the celestial spirits. Unlike the latter two, Ibn ʻArabi is dismissive of engaging with the *arwāḥ* directly for the purposes of influencing the

[83] Maslama b. Qasim al-Qurṭubi, *Picatrix: Das Ziel des Weisen*, ed. Hellmut Ritter (Leipzig: B.G. Teubner, 1933), 85, translated in Saif, "Between Medicine and Magic," 320.

[84] For a detailed analysis, see Saif, "From *Ghāyat al-ḥakīm*," 329.

terrestrial world. For him, the *arwāḥ* carry divine knowledge only to the "righteous souls," which are understood to be the spirit of the Prophet Muhammad (*rūḥ al-rasūl*) and that of the other Prophets (*rūḥāniyyāt nabi*).[85] In the case of the *Kitāb al-diryāq*, as Andromachus has been elevated to the ranks of the saints and invoked in the manner of the Prophet, the association with the *arwāḥ* is the means through which divine secrets can flow into the natural world.

6.4 Diagrams as Healing

The discussion in this chapter thus far has examined agency from a multivalent perspective: the first section analyzed the diagrams as cognitive tools, mapping the intellectual and spiritual realities of the scribe; in the section on magic and talismans, the diagrams themselves are interpreted as dynamic and active agents. In this section, the sight of the beholder is the activating entity that allows for yet another discussion on the functionality of the diagrams, particularly in conjunction with its readers and viewers. Vision, optics, and perception has been the topic of pursuit in Arabic scientific and intellectual literature, including by well-known figures such as Ibn al-Haytham (d. 1040) and Ibn Sina (to which the discussion will return to later). Sight also has been explored in the popular imagination as a haptic relationship between the viewer and the object, predominantly in current scholarship relating to pilgrimage, piety, and the supernatural (see Chapters 3, 4, 5).[86] The extramission theory of vision—explicated by Euclid (fl. 3000 BC) and discussed by Saint John of Damascus (d. c. 749 AD), the Byzantine historian Michael Psellos (d. c. 1078 AD), as well as among Arab philosophers, such as al-Kindi

[85] Saif, "From *Ghāyat al-ḥakīm*," 329.

[86] See Georgia Frank, "The Pilgrim's Gaze in the Age before Icons," in *Visuality Before and Beyond the Renaissance: Seeing As Others Saw*, ed. Robert Nelson (Cambridge: Cambridge University Press, 2000), 98–115; and Liz James, "Senses and Sensibility in Byzantium," *Art History* 27 (2004): 522–37.

(d. c. 873 AD) amongst others—explains sight in the form of rays emitting from the eyes to the object in order to grasp the image. In this way, sight resembles the tactile sense, where the viewer initiates the reach in order to make contact with the object. Far from a passive sense, sight was understood as "active, continuous, and connected."[87] Due to its active nature, sight was not always neutral. For instance, pious individuals were sometimes able to attain spiritual visions by looking at icons in a Byzantine church.[88] Alternatively, sight could be destructive. The concept of the evil eye was premised on such a framework where looking alone had the power to bewitch or destroy a person or thing—a fear that prevailed across social classes.[89] As such, sight was performative; that is, looking was doing.[90] The preceding chapters illustrate the diversity of objects that functioned on the basis of this sight mechanism. These objects—of pilgrimage, piety, supernatural—also share visual patterns of script in circular and quadrilateral shapes. The active role of sight within viewer/object relationships in such objects—both because of thematic and visual parallels with the *Kitāb al-diryāq* —provides a Late Antique /medieval framework that can be applied to the diagrams in the treatise.

The activating power of sight is predominant in the realm of toxicology. The *Book of Poisons* by Ibn Wahshiyya (fl. 930) categorizes poisons by individual senses, highlighting that one could be killed by a poisonous snake through sight alone.[91] In the folios of the *Kitāb al-*

[87] Robert Nelson, "To Say and See: Ekphrasis and Vision in Byzantium," *Visuality before and beyond the Renaissance: Seeing As Others Saw*, ed. Robert Nelson (Cambridge: Cambridge University Press, 2000), 155.

[88] James, "Sense and Sensibility," 7.

[89] Nelson, "To Say and See," 155.

[90] Nelson, "To Say and See," 155.

[91] Martin Levey, "Medieval Arabic Toxicology: The Book of Poisons of Ibn Wahshiyya and its Relation to Early Indian and Greek Texts," *Transactions of the American Philosophical Society* 56, no. 7 (1966): 11.

diryāq one reads about a snake that is called Muqtabas, "it does not kill by biting; rather it kills all those who look at it and hear its whistling" (see Appendix, page 28). A similar idea is mentioned by al-Damiri (d. 1405), the Egyptian writer on zoology, about a snake named *al-Aṣalah*, whose poisonous sight "is like that of a human being, that is of an immensely large size, and that it remains in the same conditions even if a thousand years pass over it."[92] Poisonous glances by snakes are known since antiquity and have been discussed in numerous written sources of the medieval period.[93] What is striking about al-Damiri's quote is that the poisonous glare of the snake is compared to that of a human (rather than the other way around), alluding to the nature of the human eye as significantly more powerful than that of a poisonous snake. The reverse is also true: if sight can kill, sight can also heal. In Ibn Wahshiyya's treatise, the sight of a sparrow was considered an antidote from snake poison.[94] Similarly, looking at statues of serpents were known to heal the poisoned individual.[95] The performative aspect of sight is also evident in material culture associated with pilgrimage in the regions of Byzantine Syria and Palestine (see Chapter 4). Gary Vikan's discussion highlights not only the significance of materiality (clay and dust from holy places), and the power of words and images, but also that "seeing was essential to healing."[96] The healing in this case refers to the alleviation of the physical symptoms of the body as well as spiritual healing mediated by the image of the saints featured on the objects. The circular rendition of script on the pilgrimage tokens and flasks

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[92] Sara Kuehn, *The Dragon in Medieval East Christian and Islamic Art* (Leiden: Brill, 2011), 22, n. 10.

[93] See Pliny, Naturalis Historia VII 1.2, 49.70 and VIII 33; and J. Ruska and M. Plessner, "Almās," in *Encyclopaedia of Islam,* Second Edition, accessed December 21, 2020, http://dx.doi.org/10.1163/ 1573-3912_islam_SIM_0556.

[94] Levey, "Medieval Arabic Toxicology," 11.

[95] Kuehn, *The Dragon*, 23.

[96] Gary Vikan, *Sacred Images and Sacred Power in Byzantium* (Aldershot: Ashgate, 2003), 73.

serves as valuable comparative material for the *Kitāb al-diryāq* diagrams, illustrating the reception and functionality of text patterns phenomenologically in the realm of healing. The magic squares are another example that operate through sight mechanism. To ease the physical pains associated with childbirth, the pregnant woman must "gaze intently" at the magic square in order for it to be efficacious (see Chapter 4). In the same way, I argue that the diagrams of the *Kitāb al-diryāq* were designed to hold on to the individual gaze to provide therapeutic effects of the theriac—or the potentiality of therapy—through the sense of sight. Given that the manuscript was a prized book originally composed for an Imam's library, the inherent value of the script-laden diagrams was equally in the knowledge of the potential curative power of the image.

Sight, however, is not merely the act of looking. Seeing also involves the act of contemplating. Seeing was synonymous with contemplation, especially in magical, esoteric, and wonder-producing materials. Describing the pagan statues of Constantinople as "objects of wonder," the eighth- or ninth-century *Parastaseis* cautions the viewers: "Pray not to fall into temptation and be on your guard when you *contemplate* ancient statues, especially pagan ones."[97] In this Greek treatise, sight is articulated as contemplative as well as performative, that is, the viewer's extended gaze activated the power within the statues. Similarly, many of the materials discussed in chapters 3–5 were designed for the purposes of not only attracting, but also of securing the gaze—of humans, beasts, and supernatural beings. Animal imagery—also part of the wonder genre (*'ajā'ib*)— as apotropaic in the Byzantine and Islamic public spaces attracted and suspended the gaze of its likeness.[98] The ornamental motifs in Late Antique textiles

[97] Liz James, "'Pray Not to Fall into Temptation and Be on Your Guard': Pagan Statues in Christian Constantinople," *Gesta* 35, no. 1 (1996): 12, 15.

[98] Flood, "Image," 154.

with complex knotting and interlacing design similarly captured the attention of the demons, trapping their gaze (see Chapters 3 and 4). The intricacy of the diagrams in the *Kitāb al-diryāq* suggest that they were crafted for identical reasons, to attract and hold the viewer's gaze for a prolonged period of time. That the scribe identifies them as "wondrous" contributes to his likely intention of contemplation. Considering the medieval framework of performative sight, particularly in the realms of toxicology and magico-medicinal materials, suggests that looking at—that is, contemplating—the *Kitāb al-diryāq* diagrams was itself part of the healing process. Seeing the diagrams of the *Kitāb al-diryāq* allows one to contemplate on the wondrous nature of the concept of theriac: the effects of the individual and combined drugs, the harmonious proportions, and its miraculous effects on the human body. The act of contemplation is itself mentioned in the treatise as integral to its development: "For another fifteen years, he [Andromachus the Younger] contemplated the improvement of the theriac of Magnus …"[99] The result of his contemplation was the miraculous theriac. Thus, it is in the contemplation/looking that one might find the magical. In the case of the theriac, the magical constitutes the healing effects of the drug on the body. The talismanic frontispiece, and the mention of *arwāḥ* and *al-'ajāb,* contributes to the knowledge that the theriac, according to the scribe, was operating in the natural as well as the supernatural world. The scribe has crafted the intangible wonder associated with the physical theriac into a visual manifestation. The pharmacological wonder of the theriacal electuary is thus embodied in a palatable visual medium — one that can be activated through the viewer's contemplation.

Healing can also take the form of spiritual piety and elevation. Akin to physical recovery, spiritual healing included a prolonged period of contemplation. The theriac, in the medieval

[99] Kerner, "Art in the Name," 85.

imagination, is synonymous with healing in the broadest sense. This phenomenon is expressed by al-Buni: "the Qur'an is a theriac," and that the first chapter of the Qur'an is the antidote for poison.[100] Both the Qur'an and the theriac embody the wondrous qualities that transcend the physical realm. Thus, one might perceive the theriac in the same way as one perceives the Qur'an, that is, internally in the heart and the soul. Al-Jurjani describes the perception of the Qur'an as an impression on one's heart and the role of analogies as mediating this process.[101] The focus on the heart is predominant in esoteric and mystical writings that emphasize the role of Arabic letters in cosmological doctrines (see Chapter 4). The writings, evolving within a Neoplatonic framework, adopt the role of contemplation from its earlier leanings in the mind to an exposition that situates contemplation within the heart.[102] The heart and the soul are closely linked in the writings of al-Ghazali for instance, where hidden knowledge (*bāṭin*) might only be achieved "through the actions of the heart."[103] In the *Bayān al-Farq* (Treatise on the Heart), al-Hakim al-Tirmidhi (d. c. 932) explicates the cosmology of the heart in the form of a series of concentric circles, while illustrating the heart as the organ that has a direct relationship with the eye.[104] Even Plotinus, the father of Neoplatonic theories, speaks of contemplation as a circular

[100] Tewfiq Canaan, "The Decipherment of Arabic Talismans," in *Magic and Divination in Early Islam*, ed. Emilie Savage-Smith (Aldershot: Ashgate, 2004), 128, n. 20. For apotropaic and propitious practices related to individual verses of the Qur'an, including for healing, evil, and witchcraft, see Marie Efthymiou, "Persian Glosses on a Qurʾanic Manuscript from Central Asia," in *Word of God, Art of Man: The Qurʾan and its Creative Expressions*, ed. Fahmida Suleman (Oxford: Oxford University Press and Institute for Ismaili Studies, 2007), 157–74.

[101] Wendy Shaw, *What is Islamic Art? Between Religion and Perception* (Cambridge: Cambridge University Press, 2019), 110–11.

[102] Saif, "From *Ghāyat al-ḥakīm*," 317–26.

[103] Saif, "From *Ghāyat al-ḥakīm*," 318.

[104] See Shaw, *What is Islamic Art?* 114.

pattern, one that is illustrative of a sense of endless continuity.[105] Sight is an extension of the heart. And the heart perceives through sight. The treatises of al-Buni similarly emphasize contemplation and meditation that include geometric shapes and Arabic letters (see Chapter 4). Healing in this way is also evident in treatises of the Kabbalah that incorporate Hebrew characters and geometric diagrams as a means to achieve spiritual salvation.[106] In Qazwini's *'Ajā'ib al-makhlūqāt*, contemplation is centred on the mind. Using Ibn Sina's framework of internal senses, Persis Berlekamp discusses the process of visual perception: the images in the manuscript appeal to the eye, which collaborates with the internal senses and the intellect. The viewer is then able to contemplate God's wonder and creation with the help of the intellect, mediated by the images.[107] In the Aristotelian discourse, the mind is likened to a wax tablet, able to receive impressed images. This intellectual paradigm is equally evident in practice. Objects associated with Late Antique pilgrimage (discussed in Chapter 4), hinge on the mind and sight for efficacy. Late Antique Christian pilgrims, especially prior to the proliferation of icons, relied on their eyes as a permanent and tactile reminder of the sacred: "the ears are naturally less reliable than the eyes—because very often forgetfulness follows what we hear, whereas the memory of what we have seen is not easily erased but remains imprinted on our minds like a picture."[108] The pilgrimage objects—with script compositions identical to the pages of the *Kitāb al-diryāq*—are, therefore, understood to make a lasting and permanent impression on the

[105] David Hernández de la Fuente, "The One and the Many and the Circular Motion: Neo-Platonism and the Poetics in Nonnus of Panopolis," in *New Perspectives on Late Antiquity*, ed. David Hernández de la Fuente (Cambridge Scholars Publishing, 2011), 307–11.

[106] Lancaster, "On the Relationship," 231–50.

[107] Berlekamp, *Wonder*, 21–2.

[108] Frank, "The Pilgrim's Gaze," 107, n. 88.

viewer's mind. The image has a physical impact on the mind and hence body. The healing, discussed by Vikan above, occurs precisely through this interaction between the object and the viewer. Whether on the mind or the heart, the act of contemplation provided a sense of agency to the viewer and actively contributed to the process of healing.

Medieval theories on visual perception discuss the role of sight, memory, and contemplation. In his *Kitāb al-manāẓir* (The Book of Optics), the tenth-century scholar Ibn al-Haytham synthesizes the Euclidian and Aristotelian visual theories to discuss how sight can receive form (*ṣūra*) in geometric configurations.[109] In this intromission theory, the viewer perceives the form in two stages. The first is immediate, where the viewer is able to grasp the "visible properties" of the form, such as shape (*shakl*) and colour. Ibn al-Haytham refers to this subconscious stage as "perception by sign."[110] The second requires sustained attention and contemplation, to completely absorb all the minor details of the form, such as the presence of minute script.[111] In both cases, memory plays a significant role, allowing for the images to be compared and recognized by the faculty of judgement. Repeated exposures to similar shapes (*shakl*) allows the brain to produce a "universal form (*ṣūra kulliya*)" within the imagination, which constitutes the basis for evaluating subsequent images.[112] If we examine the *Kitāb al-diryāq* diagrams within this framework of visual perception, the shape (*shakl*) of the diagrams, both circular and quadratic, would have been one of the first visual features that the viewer might consume and recognize. Building on Ibn al-Haytham, the *Kitāb al-diryāq* diagrams may be

[109] A.I. Sabra, "Sensation and Inference in Alhazen's Theory of Visual Perception," in *Optics, Astronomy, and Logic: Studies in Arabic Science and Philosophy,* edited by A.I. Sabra (Aldershot, Hants: Variorum, 1994), 162.

[110] Sabra, "Sensation," 176–7.

[111] Sabra, "Sensation," 169.

[112] Sabra, "Sensation," 175.

called "signs," images that the viewer can instantaneously and subconsciously infer, precisely because of the simplicity of the geometric shape.[113] The pattern is then compared within the mind's memory bank, where the universal form resides. Ibn Sina similarly emphasizes the role of the intellect and memory in image perception through illustrating the five internal senses (faculties of common sense, representation, imagination, estimation, and memory) that contribute to meaning making.[114] Sight, as an external sense, collaborates with the internal senses in order for the viewer to comprehend the visual image. The diagrams of the *Kitāb al-diryāq* are thus not articulated by the viewer in isolation; rather, the viewer perceives the images in relation to those previously known. Extending Ibn al-Haytham's argument of shape (*shakl*) as signs, the geometric configurations of the *Kitāb al-diryāq* would draw on the viewer's cultural and visual knowledge, illustrated in the preceding section as embodying the supernatural world. The shape (*shakl*) is thus an attempt at visualizing that hidden knowledge—one which the viewer would have subconsciously perceived. The ingenuity of the scribe, however, lies in the carefully constructed details of the diagrams, particularly the execution of script, which are an invitation for the viewer to pause and reflect. The intricacy and the variety of the diagrams urges—perhaps even traps—one to imbibe visually the contents of the pages. In this way, the diagrams automatically lead one to an extended period of contemplation, which, according to Ibn al-Haytham, is the only way in which the viewer might partake in the "true form" of the image.

[113] There are other characteristics of the image that might be added, but this discussion takes "shape" as the focal point. See Sabra, "Sensation," 177 for a complete list. See also Bierman, *Writing Signs*.

[114] Berlekamp, *Wonder*, 21.

6.5 Diagrams, Knowledge, and Late Antique "Revival" in the Twelfth and Thirteenth Centuries

Framing the diagrams of the *Kitāb al-diryāq* within the perspective of magical knowledge comfortably aligns with the other component parts of the manuscript: the calligraphy, the text, and the paintings. Together they communicate the theriacal knowledge as one that transcends the terrestrial realm. For example, the use of opulent calligraphy that is reminiscent of the Qur'anic manuscripts visually elevates the text, signifying that the information presented on the pages of the *Kitāb al-diryāq* was tantamount to the sacred words of the holy text (see Chapter 1). The text of the theriac treatise continuously seeks to establish the efficacy of the antidote by explicitly invoking the authority of antiquity, the spirits, and God. Similarly, the paintings include talismanic imagery as part of its opening set of images and illustrate the themes of wonder and discovery within its narratives. The analysis in this chapter also acknowledges the multivalency of the diagrams, the compositions parading a sense of "medical pluralism:" the natural, the astral, and the spiritual elements are all participants in the healing process.[115] While the majority of the analysis takes the lens of magical knowledge (theories, practices, and images) in articulating the script patterns of the *Kitāb al-diryāq*, the medieval imbrications in the knowledge frameworks of "magic" and "science" means that the reverse also holds true: that is, that one can expand the definition of "science" to include elements of astrology, astral magic, narratives, and contemplation (for a further discussion on "magic" and "science," see also Conclusion).[116]

[115] Peter Pormann and Emilie Savage-Smith, *Medieval Islamic Medicine* (Washington, DC: Georgetown University Press, 2007), 2, 144.

[116] For a discussion of the diagrams from the perspective of science, see also, MacMurdie, "Proven Recipes," 331–58.

The twelfth and thirteenth centuries more specifically—the time period for the production of the manuscript—has been described by many scholars as a conscious "revival" of Late Antique visual and intellectual knowledge, especially in medieval Jazira (for this discussion, see also Introduction). The theriac is a prime example of this "revivalist" knowledge appropriated within the Islamicate sphere and glorified through the manuscript of the *Kitāb al-diryāq*. Recognizing the "revivalist" tendencies within this period, the emergence of geometric script patterns within the manuscript can be approached from a similar standpoint; that is, as a "revival" of Late Antique modes of visualizing knowledge, in particular, magical knowledge. The previous chapters have illustrated the widespread dissemination of magical objects with script patterns in Late Antiquity; the resurfacing of these patterns in the medieval period cannot be firmly traced to periods earlier than the twelfth and thirteenth centuries, nor do they appear as profusely in the earlier periods as they do during the twelfth and thirteenth centuries. The resurgence of script patterns within the *Kitāb al-diryāq*, therefore, suggests a "revival" of Late Antique ways of representing and communicating the natural, astral, and spiritual dimensions of the antidote. As with the adaptation of Greek physicians in the Islamicate realm through the guise of Arab dress, the geometric script patterns have similarly been adapted from their Late Antique counterparts using Arabic script. The malleability of the components of Arabic script has further allowed the scribe to accentuate the geometric patterns within the diagrams—as compared to Late Antiquity—while sustaining the verbal messages that bolster the images. The "revival" of script patterns coincides with a social need to visualize magical and esoteric knowledge, the rise of which is corroborated by an unprecedented number of extant magical objects and the development of Sufism in the twelfth and thirteenth centuries—all of which capitalize on the visual tool of script patterns. Just as the portraits and figural imagery on coins

from medieval Jazira were introduced as a visual language that defined sovereignty and assimilated with the local cultural traditions (see Chapter 5), the rise in script patterns may similarly be understood as a vehicle for visualizing and defining knowledge beyond the natural world. The proliferation of script patterns in later esoteric treatises, such as that of al-Buni, further suggest the diagrams of the *Kitāb al-diryāq* as forerunners of script patterns. They become a requisite agent in facilitating the "revival" of Late Antique visual and intellectual knowledge, experimenting with Arabic script, and enabling a visual transition towards mystical developments.

Conclusion

The geometric diagrams of the *Kitāb al-diryāq* are a product of the medieval visual and intellectual culture. The discussion in the previous chapters demonstrates that geometric patterns, particularly those composed using script, commonly feature within scientific, magical, and esoteric settings—the visual performance of script encouraging oral incantations, physical movements, and mental images. The *Kitāb al-diryāq* diagrams draw on such geometric script patterns from Late Antiquity and the medieval period. The discussion in this chapter illustrates the many ways in which the content of the treatise—that is, the theriac—oscillates between the overlapping worlds of magic and medicine. The diagrams are an extension of this way of knowing or worldview prevalent in the medieval period. Approaching the geometric calligraphy from this perspective sheds light on the scribe's decision to employ Galenic, cosmological, and astrological epistemologies—the diagrams acting as cognitive maps that allow the scribe to visualize theriacal knowledge. In doing so, the diagrams draw on the scribe and viewer's knowledge of the natural and the astral world, in turn engendering new knowledge on the

workings of the theriac. Such visual metaphors were also predominant in alchemical and esoteric treatises that similarly form analogies with the astral world to visualize mysterious and hidden knowledge.

Within the diagrams, the scribe's choice of words further contributes to the articulation of the images. In particular, the phrase *ghāyat al-ʿajāb* (utmost wonder) speaks to the intention of the scribe. The meticulous artistic creations, an exercise in beauty and pleasure, were a means of evoking wonder for the viewers. In the medieval visual imagination, objects of wonder in paintings exhibited motion or movement. Wonder was also associated with magical or occult properties, such as the magic square, or with shrines and supernatural intervention. The scribe's description of the diagrams as objects of wonder suggests that the diagrams were envisaged as alive and dynamic entities, ones that were capable of affective responses and of impacting the viewer's soul. In this regard, the wondrous diagrams of the *Kitāb al-diryāq* are visual parallels of *takhyīl* (imaginative creation) that formed a core component of Arabic poetics. Analogous to the diagrams, the goal of verbal mimesis and imaginative creations was to evoke awe and wonder in the minds of their listeners, eliciting an affective response.

The parallel ontologies of the theriac and the magic square allow for a rereading of the diagrams as images imbued with magical properties. The geometric shape (*shakl*) of the representations is the key feature that enables the viewer to forge relationships between the theriac and the magical world. Like the magic square, the diagrammatic visual image of the theriac inscribed on a silver bowl suggests that looking at the theriac was also a means of prophylaxis. The use of *shakl* for the magic square and its application in the form of healing suggests a similar interpretation for the *shakl* of the theriac, that is, the healing of the body. The

inscription of *amīn al-arwāḥ* on the diagrams speak to an acknowledgement of the supernatural world and astral magic.

The diagrams of the *Kitāb al-diryāq*, understood within the medieval framework of visual perception serve as meditations for healing the body, mind, and heart. The power attributed to sight meant that through prolonged contemplation, the viewer would have been able to activate the embedded magical knowledge within the diagrammatic images, thus resulting in supernatural healing. Like the talismanic frontispiece of the manuscript with intertwined serpents, the diagrams function through the activation of sight. As the diagrams are a visualization of a medicinal recipe, I argue that the diagrams represent prophylactic devices that were intended to protect the viewer from poisonous encounters. Throughout history, theriacs have been consumed not only to cure oneself from poisonous beasts, but also as a means of potential poisonous threats. The mithridatium, for instance, was allegedly consumed by the Mithridates VI (r. 120–163 BC), King of Pontus, every single day for fear of being poisoned. The bowl inscribed with the theriac, in Maimonides's treatise, was carried by Abu Marwan as a means of protecting him from snake poison. Abu Marwan did not carry the physical theriac, but merely a visual recipe of it. The diagrams functioned in the same way. They healed the body. They also made visual impressions on the mind, thus permanently attaching themselves onto the minds of the viewers. Lastly, the visual impressions of the theriac are a source of spiritual healing, impacting the heart and soul of the viewer through their gaze and reflection. The diagrams of the *Kitāb al-diryāq* creatively bring together the properties associated with geometric shapes, the properties associated with script (see Introduction), and that of the theriac itself in such visual harmony that, like the magic square, they "take on a life of their own." In considering the paradigm of "revival" of Late Antique knowledge within the twelfth and thirteenth centuries, the carefully

crafted and deliberate insertions of geometric script patterns within the *Kitāb al-diryāq* provide another example of Late Antique visual and magical knowledge revived within medieval Jazira.

Conclusion: The Medium is the Message[1]

This dissertation has examined geometric shapes and specifically, text arranged in shapes, to demonstrate the meanings and significance ascribed to them. I have argued that the geometric script patterns found in scientific and magical manuscripts, objects related to magic, and in architectural settings, are not neutral entities; rather, they had semantic value. These meanings can be better understood through the use or function of the patterns, the ways in which people interacted with them, and the contexts in which they appear. By looking closely at the world of magic—defined as accessing or controlling hidden forces and knowledge—the dissertation has established that geometric script patterns are active participants within the magical process. I argue that they are also embedded with magical meanings and take on a cosmic or supernatural significance, especially in magical contexts. In doing so, line, shape, form, and text coalesce in ways that are consistent with the scientific and popular imagination centered on the interconnected terrestrial and celestial worlds.

The dissertation takes the geometric script patterns of the *Kitāb al-diryāq* (*The Book of Antidotes*) as the primary case study to navigate the terrain of function and meaning. Chapter 1 examines the diagrammatic representations in detail, delineating the various mechanisms through which visual significance of script is prioritized over legibility. The variety of script styles and their methods of presentation manifest fully in the form of tables, quadratic diagrams, and circular compositions. Most of the theriac recipes take the form of a square or a rectangular shape—each successive diagram becoming visually more complex and intricate to illustrate the development of the theriac over time. Two full-page circular compositions (diagrams 7 and 9) mark a departure from the previous quadratic diagrams to illustrate the final recipe of the theriac.

[1] The term is coined by the Canadian media theorist, Marshall McLuhan. See Marshall McLuhan, *Understanding Media: The Extensions of Man* (London: New American Library, 1964), 1–18.

These compositions include not only a larger number of drugs, but they are also surrounded by protective phrases and blessings where script and line converge to depict a circle-in-square pattern. The meaning and large-scale depiction of the calligraphic compositions in the theriac manuscript are not readily apparent, except for the scribe's determination to impress and please his patron. Chapter 2 examines contemporaneous Arabic manuscripts related to the realm of science to demonstrate that the geometric patterns observed in the *Kitāb al-diryāq* were part of a scholarly exercise. The diagrams in the scientific manuscripts illustrate that tabular constructions, square representations, and circular models were ways in which knowledge was visualized and mobilized. The diagrams also shaped knowledge within the dominant medieval worldviews, such as Galenism and Ptolemaic cosmology. Most interesting is the adaptation of geometric shapes in various disciplines as a way for the scribe to align with the underlying worldviews—for while the content of the diagrams differs, it is the ontological significance of the shape that is harnessed by the scribe.

Chapters 3 and 4 highlight that geometric shapes were also harnessed in the magical realm to attract and control hidden forces, mirroring the visual form employed in scientific structures of imagining the world, discussed in Chapter 2. The chapters establish the semantic significance of rectangular and circular frames that enclosed, protected, and sealed the contents inside the shape. Both rectangular and circular shapes were also used to symbolize the night sky and the rotations of the celestial bodies, as a way to access the invisible world and often to manipulate events in the terrestrial world. For instance, horoscopic charts in rectangular and circular schemata were used for purposes of divination; and circular diagrams served as visual meditations in mystical treatises, particularly due to their cosmological outlook. The magic square on the other hand was more performative: it had the capacity to heal the body. The

chapters also bring forth magical theories that are instrumental in articulating the ontology of the image, particularly with respect to the world of magic.

Chapter 5 demonstrates that geometric script patterns and magical vocabulary feature in urban spaces and coinage of the medieval period. They are often witnessed in objects and spaces that closely intersect with the cosmological and supernatural world, such as in funerary monuments and shrines—known in medieval travel sources as sites of wonder and talismanic activity. While many of the patterns are composed using apotropaic text and pious phrases, the geometric shape continues to be the central focus that orients the viewer's imagination. The goal of the last four chapters was to highlight the interplay of script and geometric patterns in the domain of scientific manuscripts, magical knowledge, and in urban spaces. In each of these intersecting genres, the geometric shape is not a passive entity that might be relegated to decoration; rather, each of the chapters point to the active agency of the image, one that shapes cognition and perception. In this light, the final chapter offers an analysis of the geometric script patterns that appear within the folios of the *Kitāb al-diryāq* through four interconnected readings. First, the diagrams are interpreted as visual metaphors, where they form alliances with dominant frameworks of medieval medicine and cosmology. Second, the diagrams are analyzed as sites of wonder, operating on an affective and cognitive level. Third, the geometric patterns are characterized as talismanic images, in that they can attract the celestial forces to achieve desired outcomes. Lastly, the diagrammatic images consider the medieval role of sight and its haptic characteristics in magical practices, suggesting that the diagrams also functioned as prophylactic images for healing the body, mind, heart, and soul. The intricate, large-scale, and conspicuous geometric shapes employed by the scribe of the *Kitāb al-diryāq* oscillate between the porous boundaries of "magic" and "science." At the same time, the patterns may be seen as products of

Late Antique "revival" that characterizes much of the visual and intellectual knowledge in the twelfth and thirteenth centuries.

Some observations can be drawn from the study of magic and script patterns conducted in this heuristic manner, together with possibilities for future directions of research. The definition of magic employed in this dissertation is expansive; the boundaries of magic are stretched as widely as possible. While this may not reflect the cultural constraints of a particular space, time, or a group of people, the capacious definition has illustrated the widespread prominence of the hidden world that manifests itself in different facets of life. Looking closely at the material and intellectual culture related to magic sheds light on the fact that magic is inextricably intertwined with healing, medicine, themes of wonder, cosmology, pilgrimage, piety, and death. Moreover, these themes spill out into the larger public arena, affecting material culture in the realms of religion and political patronage. Even in the scientific manuscripts, geometric shapes are utilized in materials related to health, medicine, astronomy, and cartography—domains that border the terrestrial world or seek out connections with the celestial world. By taking a heuristic approach and focusing on a single visual element—the combination of geometric shape and script—one can begin to chart the shared visual culture between domains that are often imagined as oppositions: magic and science; public and private; learned/institutionalized culture and popular/folk culture.

The study shows that these opposing domains, particularly "magic" and "science," are not divergent entities; rather, magical ideas and scientific structures emerged from similar means of thinking about and imagining the world. Combining verbal messages with geometric shapes communicates complex theories or paradigms within a palatable, ordered framework that helps define conceptual and spatial relationships. As such, diagrams become commonplace not only in

explicating scientific phenomena, but equally for rationalizing supernatural realities, including ideas of mysticism, theology, and the sacred. Michael Camille rightly notes that the script patterns utilized in magical settings "were not only intimately connected with, but built out of the very structures of orthodox discourse against which they are so often opposed."[2] While Camille's arguments relate to medieval European materials, they are equally applicable in the case of Late Antiquity and the medieval Mediterranean. The objects in this study illustrate how esoteric treatises visually build on Ptolemaic cosmology, or how magic squares emerge from a thorough grasp of geometrical principles. The genres build on one another using the visual tool of the geometric shape. The two primary shapes outlined in this project—the square and the circle—have both been shown to capture natural and supernatural worlds. The square, more generally, embodies a sense of rationality, logic, and internal relationships. As such, it has been used pervasively to explain the workings of humoral medicine. The circle, on the other hand, finds a closer connection with the idea of perfection and therefore, becomes a key feature in the representation, explication, or communication with the divine and the hidden world. Both geometric shapes have "an ontological rapport with the ultimate truth."[3] These geometric images were associated in the medieval mind with greater power and knowledge—and the ability to transcend the bounds of verbal knowledge. This dissertation has mostly examined patterns that fall within the broad parameters of magic outlined in the Introduction; however, further study of geometric script patterns in more non-magical or "orthodox" settings can highlight the reach of magic or hidden forces as an important cultural and intellectual framework of medieval

[2] Michael Camille, "Visual Art in Two Manuscripts of the Ars Notoria," in *Conjuring Spirits: Texts and Traditions of Medieval Ritual Magic*, ed. Claire Fanger (Pennsylvania: Pennsylvania State University Press, 1998), 135.

[3] Barbara Obrist, "Visualization in Medieval Alchemy," *HYLE International Journal for Philosophy and Chemistry* 9, vol. 2 (2003): 131.

Islamicate societies. Furthermore, a comparative study with medieval European diagrams and script patterns from the Latin West would provide an interesting assessment of whether geometric shape, script, and magical associations continued to be intertwined. As the intellectual knowledge base of the Latin West inherited significantly from Greek and Arabic knowledge, especially with the translation of numerous Arabic occult sources in the twelfth and thirteenth centuries, a cross-cultural study can further elucidate the links between magic, shape, and script.[4]

This study is a little unconventional in its use of a long time frame and a vast geographical area in the study of materials relating to magic (Chapter 3–5), the reasons for which have been discussed before. Tracing the trajectory of the geometric shape and script in this heuristic exercise reveals that objects related to magic are abundant in Late Antiquity; they surface back again in large numbers only around the eleventh and twelfth centuries. There appears to be a gap in materials between this time. Part of the reason is that the extant magical materials such as the block-printed amulets and the magical gems are fragmentary and challenging to date, and it is possible that they might belong within this gap period. However, part of the reason for the profusion of materials between the eleventh and thirteenth centuries might relate to the resurgence of Late Antique knowledge during this period, of which magic and its visual manifestation were component parts. The penchant for Late Antique knowledge was prevalent in the courts of the Seljuq successor states, the *Kitāb al-diryāq* being an important example of the revival of antique knowledge. The objects studied in this dissertation corroborate that Late Antique visual and magical practices also witness a resurgence in medieval Jazira, such as seen in figural coinage or magic-medicinal bowls. Furthermore, the "revival" appears to have been long-lived. For instance, Chapters 3 and 4 have shown that magical practices involving the

[4] See Charles Burnett, *Arabic into Latin in the Middle Ages: The Translators and their Intellectual and Social Contexts* (Farnham: Ashgate: 2009).

Arabic script in geometric arrangements, either through encirclement or division of text continue into the early modern period. In fact, similar magical practices of healing the body and warding off evil by looking at apotropaic or sacred text can also be found as part of *hilye*s (verbal portraits of Prophet Muhammad) in Ottoman Turkey or seen in the talismanic chart from nineteenth-century Iran discussed in Chapter 3.[5] Further scholarship can take the heuristic model of this study into the early modern period to evaluate the reasons for the persistence of such images. The *longue durée* approach has been particularly insightful in tracing the ways in which patterns and related practices are retained across time. For instance, the similarities between the Greek Magical Papyri and the works of al-Buni are particularly striking. Not only do they both include names of powerful deities, elements of binding name and potent phrases, the idea of hidden names, and the significance of time, but they also provide instructions for geometric constructions, where script plays an instrumental role. This dissertation provides the groundwork for future comparative studies that employ identical visual and ritualistic practices across time and space.

The last two points concern visualization of knowledge more generally. The copious amounts of information packed into the patterned images, be it a single diagram of the *Kitāb al-diryāq*, the lengthy Aramaic incantations on bowls, or the moulded script panel at the Nuri mosque—the complexity of all the images has an overwhelming impact on the viewer. The intricate details of the images are created through the insertion of script or pseudo-script, one that has palpable associations to knowledge. The diagrams become visual manifestations of knowledge, whether one may be able to verbally decipher its contents or not. The greater the amount of the script on the image, the more worthy or significant the image was perceived to be.

[5] See a discussion of Ottoman *hilye*s in Jamal Elias, *Aisha's Cushion: Religious Art, Perception, and Practice in Islam* (Cambridge: Harvard University Press, 2012), 270–82.

In fact, the aesthetic of detail and encyclopaedism was not unique to magical knowledge, but characteristic of Late Antique visual and literary culture. Accumulation, systematization, and organization of knowledge was seen as an aesthetic choice and an argument.[6] Arabic treatises, especially the summary tradition emerging from the Alexandrian schools (see Chapter 2) illustrate the continuation of the Late Antique obsession with the collection of vast amounts of data that have been neatly packaged. The information in these manuscripts was a series of condensed arguments, but it was the visual evidence of script and its presentation (tables, squares, circles, branches) that conveyed to the viewer a holistic and comprehensive study. Such ideas are starkly resonant of visual representations and viewing practices in Late Antiquity, with notable maps such as the Peutinger Table and the Forma Urbis Romae serving as aesthetic precedents that percolate into medieval aesthetics and imagination.[7] In both images of Roman maps, schematic representations, copious amounts of detail, and lack of concern for functional viewing communicate ideas about the Roman imagination of cities rather than geographic accuracy. The pages of the *Kitāb al-diryāq* are designed in precisely the same manner—an aesthetic of detailed knowledge paired with geometric patterns that resonate with the medieval cultural imagination rather than being geared for functional reading. This idea is consistent across the diagrams examined in this dissertation, arguing for a shared culture of viewing images among the many genres.

The visual reception of knowledge leads me to my final point: the iconic value of script. In this study, the role of script has been articulated foremost through the visual arrangement of letters, rather than the positivist readings of the script. While the symbolic value of calligraphy—

[6] Scott Fitzgerald Johnson, "Travel, Cartography, and Cosmology," in *The Oxford Handbook of Late Antiquity*, ed. Scott Fitzgerald Johnson (Oxford: Oxford University Press, 2012), 568.

[7] For more on these maps, see Johnson, "Travel," 567–72.

especially monumental calligraphy—has been discussed in scholarship, approaching script from the perspective of its visual shape has allowed for a specific set of meanings to emerge.[8] The semantic role of shape and the functional contexts discussed in the dissertation affirm that the varied planar orientations of script were designed to be seen and understood, not necessarily read. From this perspective, visual literacy is as important (if not more) than verbal comprehension.[9] The monogram of the Roman statesman discussed in the Introduction to this dissertation, which is described as being in the domain of *intelligi* rather than *legi*, also explains much of the geometric script patterns surveyed in this study that function in the same manner. They embody ways of organizing, imagining, and manipulating the world. That being said, this dissertation has not ignored the verbal meanings of the text and has often considered the text as an important and powerful element of the magical repertoire. However, magical efficacy was not always contingent on reading the words; rather, the sacred, pious, and apotropaic words operated in an ontological capacity. This dissertation has illustrated the specific ways in which objects and images participated in magical contexts, demonstrating the iconic significance of script. The arrangement of the script in meaningful patterns, their agency, and the ways in which they shape and are shaped by their makers and viewers suggests that the medium, that is, the geometric form, is the message.

[8] For studies on iconicity of Arabic script and its role as visual signifiers, see Elias, *Aisha's Cushion*, 236–83; Yasser Tabbaa, *The Transformation of Islamic Art during the Sunni Revival* (Seattle: University of Washington Press, 2001; Irene Bierman, *Writing Signs: The Fatimid Public Text* (Berkeley: University of California Press, 1998); and Robert Hillenbrand, "Qur'anic Epigraphy in Medieval Islamic Architecture," *Revue des Études Islamiques* 54 (1986): 171–87.

[9] For visual literacy more generally, see also Ryan Bonfiglio "Visualizing Literacy: Images, Media, and Method," *Biblical Interpretation* 25 (2017): 293–319; and Andreas Rhoby, "Text as Art? Byzantine Inscriptions and their Display," in *Writing Matters: Presenting and Perceiving Monumental Inscriptions in Antiquity and the Middle Ages*, eds., Irene Berti, Katharina Bolle, Fanny Opdenhoff, and Fabian Stroth (Berlin: de Gruyter, 2017), 265–83.

Glossary

Unless noted, the definitions are based on the *Encyclopaedia of Islam*, Second and Third Editions. The definitions focus on the practices and ideas of the medieval period, between the eighth and the thirteenth centuries. I have provided the initial term in the language (Arabic/English) that is most used in the dissertation for the identified concept. For more details on each, see the relevant entries in the *Encyclopaedia*.
* these terms are modern heuristic categories and do not necessarily conform to premodern modes of classification.
** terms taken from Emilie Savage-Smith, ed., *Magic and Divination in Early Islam* (Aldershot: Ashgate, 2004).

abjad	numerical values of Arabic alphabets.
ʻajāʼib (sing: *ʻajab*)	wonders/marvels of God's creation.
amulet	something worn on or close to the body to avail its magical properties.
baraka	blessings; generally related to well-being, healing, or protection from evil. Prophets and sacred personages were often seen as sources of *baraka.*
basmala	a formula invoked at the beginning of any action, blessing and consecrating it.
budūḥ	a magic square of the third order (three rows and three columns), in which the numbers have been substituted by their alphanumeric equivalent (*abjad*). This square is known for its talismanic properties, and often can be invoked by saying or writing its name.
dhikr	the act of remembrance (of God), taking the form of oral repetition of words and phrases. The practice is common in esoteric/mystical traditions of Islam where *dhikr* is a form of prayer, reflection, and meditation.
divination*	system of foretelling the future. Horoscopes were one of the most popular forms of divination. Divination falls in the category of occult sciences.
esotericism (*bāṭin*; *bāṭiniyya*)	inner meaning or secret knowledge. The term is used in opposition to exotericism (*ẓāhir*), or outward knowledge. The term relates to comprehending knowledge; it is less

	concerned with action. Esotericism falls under the category of occult sciences.
geomancy (*'ilm al-raml*, lit., the science of sand)	in the Islamic context, a form of divination in which dots are plotted (initially, on sand) and interpreted as a means of predicting events.
gnosis	acquired by those who participate in mystical practices. A direct perception of the divine truth. Arabic terms used to define this concept include: *'arif; ma'rifa*; *'irfān*.
Greatest Name of God** (*al-ism al-'aẓam*)	the hundredth name of God. This name was kept secret and revealed only to those part of the esoteric communities (see also Most Beautiful Names). The name is often represented by a string of seven symbols.
khātim	seal or a signet-ring. The term is used to denote the seal impression and the seal matrix.
Latin square**	a version of a magic square containing a set of symbols (letters, words, numbers, or marks). Each row and column include the same set of characters but arranged in a different order.
letter magic (*sīmiyā'*)	use of the occult properties of letters for worldly gain.
Linear Kufic[1]	angular Arabic script in which the letters and words are connected using a horizontal base line, making it challenging to distinguish the words. This style of writing was commonly used on objects of a magical nature.
magic square (*wafq*)	literally means "harmonious arrangement." A magic square is one in which consecutive natural numbers are arranged in a way that the sum of each row, column, and diagonal are the same.
miracle (*mu'jiza*)	control and manipulation of invisible forces (magic), but in association with prophets or saints.
Most Beautiful Names of God (*al-asmā' al-ḥusnā*)	the term is mentioned in the Qur'an. It is widely believed that there are ninety-nine names of God under this category. The use of the Most Beautiful Names was

[1] The term "Linear Kufic" was put forward by P. Casanova, "Alphabets magiques arabes," *Journal Asiatique* 18 (1921): 37–55; and is discussed Venetia Porter, "The Use of the Arabic Script in Magic," *Proceedings of the Seminar for Arabian Studies* 40 (2010): 131–40.

	popular in Sufi practices, as well as in talismanic treatises such as al-Buni.
muḥākāt[2]	the Arabic term used for the Aristotelian concept of mimesis. The concept is adapted in Arabic poetics where it is understood as exhibiting similarities or inviting comparisons through metaphors. See also *tashbīh.*
mysticism*	direct, experiential knowledge of the hidden world; a subset of esoteric knowledge. In the Islamic tradition, mysticism is commonly associated with Sufism (t*aṣawwuf*).
Neoplatonism	philosophical tradition of Late Antiquity that was popular in the medieval Islamic period. The philosophy posited the idea of a supreme first principle, the One, from which all else emanates. Everything in the world is therefore connected.
nīranj	prestidigitation, creating illusions, and sleight of hand tricks (*ḥiyal*).
occult properties (*khawāṣṣ*)	hidden or unseen properties/forces. An occult property is one that cannot be explained by the elemental constitution of an object.
occult sciences[3]	known in Arabic as *'ilm al-khafiyya*/*'ilm al-ghayb.* They are sciences that deal with hidden properties. This category includes astrology, alchemy, divination, astral magic, letter magic, among others. Medicine is sometimes included by medieval Arabic authors in this category. The occult sciences generally harness celestial and earthly powers for worldly gain. Hidden truths can be reached through an intellectual approach (such as astral magic) or revelatory approach (such as esotericism/ *bāṭiniyya*). The former includes more action-oriented components.
ruqya	charms and spells used for the purposes of poisons, bites, fevers, evil eye. They were sanctioned by the Prophet Muhammad as long as they were used for beneficial, and not harmful, purposes.

[2] Taken from Lara Harb, *Arabic Poetics: Aesthetic Experience in Classical Arabic Literature* (Cambridge: Cambridge University Press, 2020), 83–8.

[3] Adapted from Liana Saif, Francesca Leoni, Matthew Melvin-Koushki, and Farouk Yahya, eds., *Islamicate Occult Sciences in Theory and Practice* (Leiden: Brill, 2021), 2–5.

Sufism (*taṣawwuf*)	the movement characterized by mystical forms of knowledge and ascetic lifestyles. The term and associated practices became institutionalized between the twelfth and thirteenth centuries.
takhyīl	in the realm of Arabic poetics, the term refers to make-believe imagery.
talisman (*tilsam*)	magical object that derives its power from celestial sources. Talismans can take the form of amulets, or can be part of architectural decoration.
tashbīh	drawing similitudes or comparisons. This literary technique was common in pre- and early-Islamic Arabic poetry. See also *muḥākāt.*
science of letters (*'ilm al-ḥurūf*; lettrism)	deals with the occult properties of the letters of the Arabic alphabet to reveal hidden truth. The letters (and their numerical equivalents) are closely connected with the world of astrology.
verse square**	a version of a magic square containing words or phrases. They are arranged in such a way that each successive row drops the first word on the right and adds an additional word on the left, generally incorporating a Qur'anic chapter or verse.
zā'irja	a divination technique that involves a series of concentric circles, letters of the alphabet, geomancy, and astrology.
ziyāra	pious visitation, pilgrimage to a holy place, tomb, or shrine.

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Appendix: Select Translations of the *Kitāb al-diryāq* (BnF arabe 2964)

The translation of select passages from the Paris manuscript (BnF arabe 2964) below has benefitted from the summary of the *Kitāb al-diryāq* produced by Jaclynne Kerner, the latter based on several extant copies of this text.[1] There are numerous differing interpretations in this current translation, which focuses solely on the contents of the Paris manuscript. The page order follows the proposed reconstruction of the Paris manuscript by Kerner.[2] The page numbers below refer to the current pagination of the manuscript. The numbers in parentheses correspond to the digital reference of the manuscript page, which can be found at: https://gallica.bnf.fr/ark:/12148/btv1b8422960m/f1.planchecontact. The phrases in bold signify points in the text where a larger, bolder, angular script style was employed.

Page 4 (view 8): Rectangular framing inscription (fragmentary)

(كت)ب هذا الكتاب اضعف عباد الله سب(حانه وتعالى محمد ابن السعيد شرف الحاج)[3]

The weakest servant of Allah, praise be to Allah, Muhammad, wrote this book. (He is the) son of the blessed from the pilgrimage … (continues below)

Page 35 (view 41): Rectangular framing inscription (fragmentary); mirror image of above

والحرمين ابي الفتح ابن الامام الرشيد ابي الحسن ابن الامام المفيد ابي العباس اسعده الله في الدنيا والاخرة

[pilgrimage] of the two sanctuaries, Abu'l-Fath, son of the rightly-guided imam, Abu'l-Hasan, son of the beneficent imam, Abu'l-Abbas. May Allah keep him happy in this world and the hereafter.

Pages 36 and 37 (view 42 and 43): Double frontispiece with astrological imagery

صاحبه وكاتبه أضعف عباد الله سبحانه محمد ابن السعيد ابي الفتح ابن الامام الرشيد ابي الحسن ابن الامام المفيد

The owner and scribe [of the book] is the weakest servant of Allah—praise be to Him—Muhammad, son of the blessed Abu'l-Fath, son of the rightly-guided imam, Abu'l-Hasan son of the beneficent imam.

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[1] Jaclynne Kerner, "Art in the Name of Science: Illustrated Manuscripts of the *Kitāb al-diryāq*" (PhD diss., New York University, 2004).

[2] Jaclynne Kerner, "A Descriptive Reconstruction and Catalogue of the Paris Kitāb al-Diryāq," in *Kitāb al-diryāq (Thériaque de Paris), édition en facsimilé du manuscrit arabe 2964 de la BnF* (Sansepolcro: Aboca Museum edizioni, 2008–9), 77–223.

[3] Fragment text reconstructed in Kerner, "Art in Name," 302. See also Bishr Farès, *Le livre de la thériaque, manuscrit arabe à peintures de la fin du XIIe siècle, conservé à la Bibliothèque nationale de Paris* (Cairo: l'Institut français d'archéologie orientale, 1953), 6.

Page 38 (view 44): Rosette medallion with chrysography between two horizontal bands

لخزانة كتب الامام العالم
الأفضل الكامل البارع عزالدين شرف الإسلام معز الائمة ملك العلماء ابي الفتح محمود ابن الامام جمال الدين محمد ابن الامام
السعيد ابي الفتح ابن الامام الرشيد ابي الحسن ابن الامام المفيد
ضاعف الله جلاله وزاد اقباله

For the library of the learned imam, the most excellent, the most perfect, the most favoured, the glory of the faith, the glory of Islam, the glorifier of imams, king of the scholars, Abu'l-Fath Mahmud, son of the imam Jamal al-din Muhammad, son of the blessed imam, Abu'l-Fath, son the rightly-guided imam, Abu'l-Hasan son of the beneficent imam, may Allah increase his greatness and augment his good fortune.

Page 33 (view 39): Rosette medallion with chrysography between two horizontal bands; mirror image of above

كتاب الدرياق للحكيم
الفاضل جالينوس من جوامع المقالة الأولى من الكتاب جالينوس في المعجونات بتفسير يحيى النحوي الاسكندراني رحمة الله
عليه وهو الباز الاشهب والعنقاء المغرب

The book of theriac (*kitāb al-diryāq*) of the eminent philosopher/physician (*al-ḥākim al-fāḍil*) Galen, from the summary (*jawāmi'*) of the first discourse (*al-maqāla al-ulla*) of Galen's book of electuaries (*kitāb Jālīnūs fi'l-ma'jūnāt*) with the commentary (*bi-tafsīr*) of Yahya al-Nahwi the Alexandrian, God's mercy upon him, and he is the wise falcon (*al-bāz al-ashhab*) and the wondrous phoenix (*al-'anqa' al-mughrib*).

Page 34, 31, 32 (view 40, 37, 38): Physicians' portraits

(the following is a collation of the text that is dispersed along the top and bottom bands of the three pages)
بسم الله الرحمان الرحيم جوامع المقالة الأولى من الكتاب جالينوس في المعجونات وهي التي ذكر فيها معجون الدرياق وخاصة
بتفسير يحيى النحوي الاسكندراني

(each page has illustrations and names of three physicians)
مارينوس/ اندروماخس/ اندروماخس
افرقلس/ يوياغورس/ ابراقليدس
جالينوس/ مغنس الحمصي/ افلاغورس

In the name of Allah, the most compassionate, the most merciful. Summary of the first discourse of Galen's book of electuaries, which narrates the electuary of the theriac and especially the commentary of Yahya al-Nahwi, the Alexandrian … (continued on page 23 below).

Marinos/ Andromachus/ Andromachus [the younger] (page 34)
Proklos/ Pythagoras/ Herakleides (page 31)
Galen/ Magnus of Emessa/ Philagrios (page 32)

Page 23 (view 29): Circular medallion
(the inscription runs across the top band, along the circumference of the medallion, inside the medallion, followed by a cursive and an angular inscription located along the bottom band)

على حد الجوامع اخرجه لأنه
اسقط ما لا يحتاج اليه من الكتاب واخذ الجوامع التي يحتاج اليه؟ معه وصهرها اساسا
بني عليها كتابه أسماء الأطباء الذين الفوا الدرياق وأحد بعد أحد وزيادة كل واحد منهم على صاحبه ممن نقدمه فيه ونقصانه
وهم تسعة فلاسفة الذين صورناهم
تحصيل سني الفترات من اندروماخس القديم الى أيام جالينوس ما لكل واحد من الأطباء الذين الفوا الدرياق
الى صاحبه غير سيني حياته التي عاش وهو في نفسه ثمان مئة وعشر سنين وعدد سيني حياتهم وما عاش
كل واحد منهم الى وقت وفاته

…according to the summary that he has verified, because he has eliminated what he did not need from the book, and taken from it that which he needs. He has simplified the foundations, which he has built upon in his book. [This includes] the names of the physicians who have created the theriac one after the other, and each one [of the physicians] have added and omitted from their predecessor, and they are nine philosophers whom we have pictured.

The sum of the years in the period from Andromachus the Elder to the days of Galen, of each of the physicians that have composed the theriac, across their lives they have lived eight hundred and ten years. And the lifespan, each one of them, until the time of his death … (continues below)

Page 24 (view 30)

من اندروماخس القديم العهد الى اخر عمر جالينوس
(table begins)
اندروماخس عاش أربعين سنة
صبيا ومتعلما عشرين سنة
عالما ومعلما عشرين سنة
ابراقليدس عاش ستين سنة
صبيا ومتعلما خمسة وعشرين سنة
عالما ومعلما خمسة وثلثين سنة
افرقلس الطبيب عاش مائة سنة
صبيا ومتعلما أربعين سنة
عالما خمسين سنة
متخلفا عشرين سنة
افلاغورس عاش خمسا وثلثين سنة
صبيا ومتعلما عشرين سنة
عالما ومعلما خمسة عشر سنة
يوياغورس عاش تسعين سنة
صبيا ومتعلما ثلثين سنة
عالما أربعين سنة
مارينوس عاش مائة سنة
صبيا ومتعلما عشرين سنة

كاملا معلما أربعين سنة
باطلا لا اختلاف ذهنه أربعين سنة
مغنس الحمصي عاش تسعين سنة
صبيا ومتعلما ثلثين سنة
عالما ستين سنة
اندروماخس القرب عاش تسعين سنة
صبيا ومتعلما عشرين سنة
عالما سبعين سنة
جالينوس عاش سبعا وثمانين سنة
صبيا ومتعلما سبعة عشر سنة
معلما ومؤلفا سبعين سنة
(table ends)

فذلك جميع سيني الفترات
بين الأطباء وايام حياتهم
ومنذ وقت ابتداء تاليف الدرياق الى وقت وفاة جالينوس
ألف وأربعمائة واثنين وأربعون سنة
فبرز اندروماخس وقد اتت عليه من السنين عشرون سنة
وهو اوّل من أبتداء بعمل هذا الدرياق و أبتدآ اخلاطه ان اندروماخس الأول اجتاز ببعض الجزائير العامرة وخرج منها الى بساتنها يريد جزيرة اخرى في الطوف فرآت غلاماً يمر في الجزيرة بين يديه از جلس يبول في اصل حائط فخرجت منه حية صغيرة لا بال بها فلدغته فبادر الى الحية فقتلها ثم صار الى شجرة الغار

…**from Andromachus the Elder to the end of Galen's lifetime**.
(table begins)
Andromachus lived for forty years
twenty years as a youth and student
twenty years as a scholar and teacher
Herakleides lived for sixty years
twenty-five years as a youth and student
thirty-five years as a scholar and teacher
Proklos,[4] the physician, lived for a hundred years
forty years as a youth and student
fifty years as a scholar
twenty years as a retiree
Philagrios lived for thirty-five years
twenty years as a youth and student
fifteen years as a scholar and teacher
Pythagoras lived for ninety years
thirty years as a youth and student
forty years as a scholar
Marinos lived for a hundred years
twenty years as a youth and student
forty years as a complete teacher
forty years, [he suffered from] mental imbalance

[4] Apart from this table, the remainder of the text considers Philagrios as the third physician, following Herakleides. Proklos' position here appears to be a scribal error.

Magnus of Emessa lived for ninety years
thirty years as a youth and student
sixty years as a scholar
Andromachus the Younger lived for ninety years
twenty years as a youth and student
seventy years as a scholar
Galen lived for eighty-seven years
seventeen years as a youth and student
seventy years as a teacher and author
(table ends)

And that [table] comprises all of the years between the physicians and their lifespan since the time of the initial composition of the theriac until the death of Galen, which is one thousand four hundred and forty-two years. Andromachus became known when he was twenty years of age, and he was the first one to begin making this theriac and to begin its mixing. Andromachus was the first to traverse some of the settled islands. He left its gardens, heading for another island in a boat. He saw, on that island, a youth passing in front of him. He was urinating in a squatted position at the base of the wall. Then from it [the wall], a small snake emerged. Unnoticed by the youth, [the snake] bit him. He hurried towards the snake and killed it, then went to the laurel tree.

Page 19 (view 25)

فأخذ من حبها فأكله وأخذ من اوراقها
شيئاً فأكله فنقدم اليه اندروماخس فقال أي شيءٍ تفعل*
وذلك ان اندروماخس كان بينه وبينه الى جأزٍ به وهو أكل حب الغار*
فقال له الساعة لدغتني حية وانا قاعد أبول فقتلتها*
فقلت لم تأكل حب الغار فقال أوماً أن حب الغار مضاد لسموم الحيوانات فقلت لا*
فقال بلي ان أبي تاجر من التاجر الأجلاء وهو ذو معروف باخذ حب الغار فيعجنه بمثله عسل منزوع الرغوة ويعرفه ويسقي منها اربع مثاقيل للسبيل لمن لسع شيء من الحيوانات فيبرئ*
ويسقيه وقت للسع قبل ان يتراقى السم الى عضو رئيس*
وانا بعيد عن الموضع فأستعمل هذا في طريقي*
وتفارقا في الطريق بأن ذلك الغلام توجّه نحو الجزيرة واندروماخس كان خارجاً منها الى جزيرة أخرى
فلما رجع اندروماخس الى مدينته حرب هذا دوآء فنظر اليه بعمل عملاً مجوداً في لسع الشئ الوقح الصغير من الحيّات والعقارب
فأجب ان يولف دواء مؤلفاً تكون منافع أقوي من منافع هذا الدوآء المفرد فأضاف اليه*
هذه الأدوية جنطيان مرّ قسط مرّ
فخرجت ادوية أربعة وخرجت منافعه في غاية ما يكون من الجودة واحكام الصنعة في التأليف

He [the youth] took from it its berries and ate it, and he took something from its leaves and ate it. Andromachus approached the youth and asked him: “What are you doing?”
Andromachus and the youth kept talking amongst themselves until they reached the point about eating the laurel berries.
He [the youth] told him [Andromachus] that sometime ago: “a snake bit me while I sat urinating and I killed it.”
I [Andromachus] said: “Why did you eat the laurel berries?”

He [the youth] said: “Don’t you know that the laurel berries are an antidote for the poisons of animals?”
I said: “No”
He said: “Yes. My father, a wealthy merchant, was known for taking laurel berries and mixing it with equal amount of honey, removing the froth, and offering four *mithqāl*s as a drink to anyone bit by an animal, and he would recover. And he would give the drink at the time of the bite before the poison propagated to the important organs [of the body].”
[Andromachus]: “And I am far from the event, and I will apply this [knowledge] in my path.”
They both [Andromachus and the youth] parted ways as the youth was headed towards the island and Andromachus was leaving for another island. When Andromachus returned to his city, he tested this medicine which was working very effectively for the bite of small, sharp-tongued snakes and scorpions.
He [Andromachus] wished to create a composite drug, whose benefits were stronger than the benefits of the single drug, so he added to it. **These drugs are as follows**: crepe ginger, myrrh, bitterwort. **The result of the four drugs and its benefits** was of high quality and the composition was of perfect manufacture/craftsmanship.

Page 20 (view 26)

فبلغت منافعه لما تالفت تسعة منافع
(table begins)
إحدهن أنه ينفع من لدغ الحيات
والثانية أنه ينفع من لدغ العقارب
والثلاثة أنه ينفع من عضة الكلب الكلب
والرابعة أنه ينفع من نهس(؟)[5] السباع الضارية
والخامس أنه ينفع من المرة السّود آوهيجانها
والسادسة أنه ينفع من اختلاط الذهن
والسابعة أنه ينفع من الحمى الربعية والمواظبة
والثامنة أنه ينفع من اورام الطحال
والتاسعة أنه ينفع من لدغ الرتيلاء
(table ends)
فصارت ادوية هذا الدرياق خمسة
(this is followed by a diagram – see Diagram 1)

When it was composed, the theriac had nine benefits
(table begins)
First, it is useful for the bite of snakes
Second, it is useful for the bite of scorpions
Third, it is useful for the bite of [rabid] dogs
Fourth, it is useful for the bite of harmful beasts
Fifth, it is useful for the disturbance of black bile
Sixth, it is useful for the confusion of intellect
Seventh, it is useful for quartan fever and persistent fever

[5] نهس is translated as نهش (bite)

Eighth, it is useful for the swelling of the spleen (splenitis)
Ninth, it is useful for the bite of tarantulas
(table ends)
And the drugs for this theriac became five
(see Diagram 1 translation)

Page 17 (view 23)

وأول من سما هذا الدرياق درياقا اندروماخس
وذلك انه سمى هذا الدرياق بهذا الاسم لعلتبن اذ كان قد وقعت عليه تجربتان*
احديهما تنفع من لدغ الهوام السبعة والهوام السبعة باليونانية تريا والثانية انه ينفع من الأدوية المشروبة السمومية و الأدوية السمومية باليونانية قاا فجمع الأسمين فسماه ترياقاً أي انه ينفع من الوجهين*
وتاليفة ايّاه انه كان يا خذ من حب الغار عشرين مثقالاً*
ومن المرّ عشرين مثقالاً*
ومن الجنتيان عشرين مثقالاً*
ومن القسط المرّ عشرين مثقالاً*
فذلك ثمنون مثقالاً يعجنه بمثل هذا الوزن عسل المنزوع الرغوة وهو بالرطل البابلي رطل واحد*
وكان يسقي منه الشربة مثقالاً بماء حارٍ*
والّف اندروماخس هذا الدرياق وقد أتت له اثنان وعشرون سنة فبقي يستعمل باقي حياتيه الى ان توفّي ثماني عشرة سنة*
والى ان ولد ابراقليدس ثما نين سنة والى ان برع في العلم خمساً وعشرين سنة*
والى ان الّف الدرياق المنسوب اليه ثمان سنين*
وذلك جمله ما بقي هذا الدرياق يستعمل لم يزد شئي*
والى القت الذي ابتداء ابراقليدس في تاليفه ماية واحد وثاثين سنة*
ثم برز ابراقليدس وقد أتت عليه
من السنين خمسة وعشرون سنة*
فنظر الى هذا الدرياق المنسوب الى اندروماخس فرآه جيد الصنعة الحكام فأحب ان يزيد في ادوية ادويةً تنفع بتمازجها لهذه الأدوية منافع اخر*
فزاد فيه أربعة ادوية فبلغت ادؤية ثمنية وهي المزادة فيه فلفل ابيض* دار صيني* زعفران* سليخة*

The first to name this theriac "theriac" is Andromachus. And he called this theriac by this name for two reasons, as he had performed two tests on it. The first, of the two, is that it is beneficial for the bite/sting of predatory[6] vermin and the predatory[7] vermin are called "tirya" by the Greeks. The second is that it is beneficial for poisonous drugs that are drunk, and the poisonous drugs are called "qa" by the Greeks. He joined the names and called it "tiryaq" (theriac) as it was useful for both purposes.
His composition [of the theriac] included taking twenty *mithqāl*s of laurel berries, twenty *mithqāl*s of myrrh, twenty *mithqāl*s of bitterwort, and twenty *mithqāl*s of bitter crepe ginger. That equals eighty *mithqāl*s that is mixed with equal measure of honey with the froth removed—that is, according to Babylonian *raṭl*s, one *raṭl*. And one should give from it, a drink equal to one *mithqāl*, with hot water. Andromachus wrote this theriac when he reached twenty-two years of age, and he continued using this for the rest of his life until he died eighteen years later.

[6] The word can be translated as "seven" (السبعة) but "predatory" (السباع) seems the most appropriate in this context.

[7] See note above.

Herakleides was born eighty years later and he excelled in knowledge at twenty-five years. And he composed the theriac, attributed to him, eight years later. And that is the sum [of the period] in which the theriac was used, without any addition to it, until the time at which Herakleides began to compose the theriac, which was one hundred and thirty-one years later.[8]
Then Herakleides came to be known at twenty-five years of age. He examined this theriac, attributed to Andromachus, and considered it to be of good craftsmanship and accuracy. He wished to increase the drugs, drugs that are beneficial to mix with this in order to achieve other benefits. He increased it by four drugs, bringing the total to eight. And the additional drugs are: white pepper; cinnamon; saffron; Chinese cinnamon.

Page 18 (view 24)

فبلغت منافعة ثلثة عشر منفعة
(table begins)
احدهن انه ينفع من لدغ الحيات الحمر
والثانية انه ينفع من لدغ اسود سالخ
والثالثة انه ينفع من نهس[9] السباع الضارية
والرابعة انه ينفع من لسع العقارب
والخامسة انه ينفع من لسع الرتيلاء
والسادسة انه ينفع من السموم المشروبة
والسابعة انه ينفع من الأدوية القاتلة
والثامنة انه ينفع من السّرطان
والتاسعة انه ينفع من الخنازير
والعاشرة انه ينفع من الوسواس
والحادية عشر انه ينفع من لتذكية الذهن
والثانية عشر انه ينفع من الرياح في المعدة
والثالثة عشر انه ينفع من الاسترخاء الأعصاب
(table ends)
فصارت ادوية المركبة تسعة وهي هذه
(this is followed by a diagram – see Diagram 2)

And the benefits reached thirteen benefits
First, it is useful for the bite of red snakes
Second, it is useful for the bite of black snakes (that changes skin)
Third, it is useful for the bite of harmful beasts
Fourth, it is useful for the bite of scorpions
Fifth, it is useful for the bite of tarantulas
Sixth, it is useful for poisonous liquids
Seventh, it is useful for deadly drugs
Eighth, it is useful for cancer
Ninth, it is useful for scrufolosis[10]

[8] The time period between the composition of the two theriacs is 131 years (18+80+25+8=131).

[9] نهس is translated as نهش (bite)

[10] The word الخنازير can also be translated as pigs.

Tenth, it is useful for obsession/anxiety (generally attributed to Satan)
Eleventh, it is useful for sharpening the intellect
Twelfth, it is useful for gas in the stomach
Thirteenth, it is useful for relaxation of the nerves
The compound medicine became nine and they are as follows
(see Diagram 2 translation)

Page 13 (view 19)

وهذا الرجل غيّر اوزان الأدوية مما الفّها اندروماخس ولم يغيّر نسخة ولم يغير هذا الدرياق الى هذا الوقت وهو ثابت في كتب الدرياق الصغير*
وتاليف اوزانه يجري على هذا
(table starts)
مر/حب الغار/جنطيان / قسط /فلفل ابيض /سليخة /زعفران /دار صيني /عسل منزوع الرغوة
[مر/حب الغار/جنطيان / قسط] من كل واحد ستة مثاقيل
[فلفل ابيض /سليخة] من كل واحد أربعة مثاقيل
[زعفران /دار صيني] من كل واحد مثقالان
[عسل منزوع الرغوة] منه ستة وثلثون مثقالاً
ينعم ضرب ذلك في قدر جديد مرصصٍ ويرفع اناء رصاصٍ*
ويستعمل بعد أربعة عشر يوماً*
وكان يسقي منه على قدر الأفات*
الافة الأولى أربعة مثاقيل
الثانية ثلثة مثاقيل
الثالثة وزنة مثقالين
الرابعة وزنة مثقال
الخامسة ثلثة مثاقيل
السادسة خمسة مثاقيل
السابعة ستة مثاقيل
الثامنة ورنة مثقالين
التاسعة ورنة مثقالين
العاشرة نصف مثقال
الحادية عشر وزنة مثقال
الثانية عشر ثلثة عشر قيراطاً
الثالثة عشر أربعة مثاقيل
(table ends)
والف ابراقليدس هذا الدرياق
وقد أتت عليه من السنين*
ثلث وثلثون سنة*
وبقي يستعمل باقي حيوته [11]
(table starts) [12]
الى ألف الدرياق المنسوب اليه ثلث سيني*

[11] Translated as حياته

[12] This table should be read backwards. In the treatise, the table is composed of one row with four columns. The text follows the correct chronology only when read from left to right.

الى ان برع بعد التعليم عشرين سنة*
الى ان ولد افلاغورس سبعة وأربعين سنة*
الى ان توفي سبعاً وعشرين سنة*
(table ends)
وذلك جملة مابقي يستعمل هذا الدرياق لا يحول منه شيء لا زيادة ولا نقصان الى ان انتداء افلاغورس الطبيب بتاليفه سبع وتسعون سنة ثم برز افلاغورس فنظر الى المعجون فاذا هو محكم الصنعة ونظر اليه مع احكام صنعة انه يحتاج الى ادوية اخر على الامر؟ الأقل أغذية يمتازج بها هذه الادوية فزاد فيه دواين فبلغت ادوية عشرة وأسقط منه العسل وجعل مكانه شراباً
فبلغت منافعة على ما ذكر سبعة عشر منفعة

And this man [Herakleides] changed the measures of the drugs that Andromachus had composed. The man did not change the formula and the theriac did not change at this time. And it was fixed in the books. The small theriac and **the composition of its measures are as follows**:
(table starts)
myrrh/ laurel berries/ bitterwort/ crepe ginger: of each one, six *mithqāl*s
white pepper/ Chinese cinnamon: of each four *mithqāl*s
saffron/ cinnamon: of each, two *mithqāl*s
honey, froth removed: thirty-six *mithqāl*s
Pulverize [the above] in a large lead-coated iron utensil and transfer it to a lead vessel. Use [this] after fourteen days. Give a drink from it according to [the proportions for] the diseases:[13]
The first disease, four *mithqāl*s
Second, three *mithqāl*s
Third, the measure of two *mithqāl*s
Fourth, the measure of one *mithqal*
Fifth, three *mithqāl*s
Sixth, five *mithqāl*s
Seventh, six *mithqāl*s
Eighth, the measure of two *mithqāl*s
Ninth, the measure of two *mithqāl*s
Tenth, half a *mithqāl*
Eleventh, the measure of one *mithqal*
Twelfth, thirteen *qīrāṭ*s
Thirteenth, four *mithqāl*s[14]
(table ends)
Herakleides composed this theriac at the age of thirty-three years. And it [the theriac] continued to be used for the remainder of his life:
(table starts)
Until he [Herakleides] died twenty-seven years later.[15]

[13] The proportion for the thirteen diseases corresponds to the thirteen diseases outlined above. For example, for the first disease (that is, the bite of red snakes), a drink of four *mithqāl*s should be given to the afflicted individual.

[14] Some of the measures differ from manuscripts studied by Kerner. See Kerner, "Art in the Name," 71–2.

[15] The table is translated in reverse order. See note 12.

Until Philagrios was born forty-seven years later.[16]
Until he [Philagrios] came to be known, after his education, twenty years later.
Until he [Philagrios] composed the theriac, attributed to him, three years later.
(table ends)
And in the remainder [of the years] that this theriac [of Herakleides] was used, nothing was changed from it. Nothing was added or removed from it until Philagrios, the physician, started to compose it ninety-seven years later.[17] Then Philagrios came to be known and he examined the electuary which was perfectly crafted, and he tested the perfect craftsmanship which needed other drugs mixed with food. The added drugs are two [in number], making it ten drugs. He removed the honey from it and replaced it with a syrup. **And the benefits reached seventeen benefits according to what he mentions**.

Page 14 (view 20)

(table begins)
احدهن انه ينفع الراس من البخارات الردية
والثانية انه ينفع من الماء في العين
والثالثة انه يذكي الذهن
والرابعة انه ينفع من الصفار في الوجه
والخامسة انه ينفع من الرياح في المعدة
والسادسة انه يقوي الفكر ويزيد في المباضعة
والسابعة انه ينفع من السموم القاتلة
والثامنة انه ينفع من نهش السباع الكلبية
والتاسعة انه يقوي البدن ويسمنه
والعاشرة انه ينفع من رخاوة المفاصل
الحادية العشر انه يذهب بحزن القلب
والثانية عشر انه ينفع من مغس[18] الشديد
والثالثة عشر انه ينفع من البواسير المقعدة
والرابعة عشر انه ينفع من لدغ الحيات
والخامسة عشر انه ينفع من حمي الربع
والسادسة عشر انه ينفع من خفقان الفواد
والسابعة عشر انه ينفع من القولنج
(table ends)
فصارت ادوية المركب منها أحد عشر دواءً مع الشراب
(this is followed by Diagram 3)

(table begins)
First, it is useful for [protecting] the head from vile vapours
Second, it is useful for water in the eye (glaucoma)
Third, it is useful for sharpening the intellect

[16] In the author's timeline (see page 24 above), Herakleides is followed by Proklos. It appears that the remainder of the text considers Philagrios as the physician directly succeeding Herakleides.

[17] Ninety-seven years is the time difference between the composition of Herakleides' theriac and Philagros' theriac (27+47+20+3=97)

[18] Translated as مغص

Fourth, it is useful for paleness of the face
Fifth, it is useful for gas in the stomach
Sixth, it is useful for strengthening the mind and increasing sexual desires
Seventh, it is useful for deadly poisons
Eighth, it is useful for the bite of rabid predators
Ninth, it is useful for strengthening and fattening the body
Tenth, it is useful for the flexibility of joints
Eleventh, it is useful for diminishing sadness of the heart
Twelfth, it is useful for severe stomach pain
Thirteenth, it is useful for hemorrhoids of the buttocks
Fourteenth, it is useful for snakebites
Fifteenth, it is useful for quartan fever
Sixteenth, it is useful for palpitations of the heart
Seventeenth, it is useful for colic
(table ends)
The compounded drugs became eleven drugs with the syrup
(see Diagram 3 translation)[19]

Page 15 (view 21)

وهذا الرجل غير اوزان هذا الأدوية وأبطل نسخة الدواء وزعم انه فاسد التركيب وأسقط من جميع النسخ والّف اوزان ادوية على هذا
(table begins)
مر/ جنطيان/ حب الغار/ قسط: من كل واحد جزوين
سليخة/ زعفران/ دار صيني/ فلفل ابيض: من كل واحد أربعة أجزاء
دقيق الكرسنة/ بصل: من كل واحد: ثمنية أجزاء
شراب: منه عشرة أجزاء
(table ends)
وكان يستعمله ويضعه هكذا

And this man [Philagrios] changed the measures of this drug[20] and negated the copy/formula of the drug, claiming the composition corrupt. And he deleted all the copies and composed the measures of the drugs as follows:
(table begins)
myrrh/ bitterwort/ laurel berries/ crepe ginger: of each one, two parts
chinese cinnamon/ saffron / cinnamon/ white pepper: of each one, four parts
vetch flour/ onion: of each one, eight parts
syrup: from it, ten parts
(table ends)
He prepared it like this
(an illustration follows)

[19] Diagram 3 still includes honey in the centre, despite that the author says that honey was removed.

[20] According to Kerner, the man was without the measures, therefore he changed them. Kerner, "Art in the Name," 73.

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كان يعمد الى البصل اولاً فيطبخه بالماء حتى يتهرأ*
ثم انه يخرجه من ذلك الماء ويطبخه بالشراب حتى يمازج الشراب ويعقده حتى يصير في حدّ العسل*
فاذا صار في حد العسل الخاثر انزله عن النار ويذر عليه الأدوية وهي مسحوقة منخولة ويضربه ضرباً كثيراً حتى يتعقد*
ويصيره في برنية خضراء ويرفعه شهراً لا يسمه فاذا كان بعد ذلك الشهر فتحه*
وكان يسقي منه*
لجميع ما ذكرنا خمسة مثاقيل*
والف افلاغورس هذا الدرياق وقد أتت عليه من السنين ثلث وعشرون سنة فبقي يستعمل*
(table begins)[21]
باقي حياته اثني عشر سنة
الى ال ولد افرقلس مائة وعشر سنين
والى ان برع افرقلس بعد التعليم أربعين سنة
والى ان ألف هذا الدرياق لنفسه عشر سنين
(table ends)
وهذا الجملة ما بقي هذا الدرياق يستعمل على غير معرفة الى ان انتداء افرقلس الطبيب بتاليفه مائة واثنين وسبعون سنة*
ثم برز افرقلس قد أتت عليه من السنين أربعون سنة*
وكان هذا الرجل بمكان من التميز والصناء[22] والحذاقة والحصافة وجودة الذهن والقياس*
فنظر الى هذا الترياق فاذا هو محكم الأدوية ناقص من استتمامها فاسد التركيب*
فأحب ان يُزيل هذا الفساد ويصير الدوآء بعينه لا يزيد فيه شياً غير العسل ويحتال؟ للشراب حتى يسقط عنه مايته التي يخاف عليه منها الفساد ويترك سائر ادوية*
اما نقصانه من استتمامها هو العسل لأن العسل هو المحيل بعضها الى بعض الماسك والمانع لها من التغير*
واما فساد تركيبها فان الشراب اذا وقعت معه الأدوية تغير الى جنس الحموضة اذا لم يكن قد تراقت مايته فصارت بخاراً*
وهذا تدبير افرقلس في هذا المعجون*
عمد اولاً فنظر فاذا دقيق الكرسنة مع الاسقيل والشراب يتألف لأن هذه هي قريبة من الأغذية فاذا كانت في ناجع الأدوية فالقي ثلثها وصيّر منها دواءً واحدً ونسبه الى اقراص الاسقيل*
والذي فعله انه طبخ البصل بالمآء حتى تهرأ ثم أخذ عصارته فجففها في الظل وسحقها واخذ منها جزواً و من دقيق الكرسنة جزواً فعجنها جميعا بالشراب و جففها*
والشراب قد افادهما التاليف مع المسك*
والخاصية التي في الشراب ذهبت ما كانت فيه من رطوبة لأنه جففه في الظل أيّاماً حتى صارت الأقراص متهششة*
وصير هذه الأقراص جزواً قائماً وهي باقية تدخل في جميع الدرياقات لم يخل منها شئي وهي ايضاً في الدرياق الكبير المنسوب الى اندروماخس القريب العهد*
وتركيب ترياقة يجري على هذا
وهو في غاية الاحكام

He proceeded with the onion first and cooked it with water until it was cooked to pieces. Then he removed it from the water and cooked it with the syrup until the syrup was mixed in. He thickened it until it became like honey. When it became thick like honey, he removed it from the fire, and sprinkled on it the drugs that were powdered and strained. He beat it a great deal until it

[21] The table is transcribed from left to right, as it should be read.

[22] Translated at صنعة

thickened. He transferred it to a green clay vessel and kept it for a month, untouched. After the month, he opened it. He would give from it a drink, of all that we mentioned, five *mithqāl*s.
Philagrios composed this theriac when he was twenty-three years of age and it was used:
(table begins)
until the remainder of his [Philagrios'] life, twelve years
until the birth of Proklos one hundred and ten years later
until Proklos became known, after his education, forty years later
until Proklos composed this theriac, attributed to him, ten years later
(table ends)
The sum [of years] that this theriac continued to be used, without [enough] knowledge, until Proklos began composing his theriac is one hundred and seventy-two years.[23] Then, Proklos emerged at forty years of age. This man was highly distinguished, skilled, intelligent, wise, with an excellence of intellect and logic. He examined this theriac which had the precise [number of] drugs, [but] it was lacking in completion. The composition was corrupted. He wished to remove this flaw and he made the medicine extremely exact. He did not increase anything except for the honey. For the syrup, he removed its water which he was afraid was [the source of] the flaw. He left the remainder of the drugs [as is]. Regarding the omissions from its completion, it is the honey because the honey is the binder and the glue of each [drug] with the other, and prevents it from any alteration. Regarding the flaws of the composition, it is the syrup. When it [the syrup] is mixed with the drugs, it becomes acidic/sour if its water is not vaporized.
This is how Proklos made this electuary.
First, he proceeded to examine it. The vetch flour with the squill and syrup mixed well because they were like foods. As they are efficacious drugs, he threw the three out [of the recipe] and turned them into a single drug. He called it *iqrās al-asqīl*. He made this by cooking the onion with water until it [turns to] pieces. Then he took [out] its juice. He dried [the onion mixture] in the shade and ground it. He took from it one part, and one part from vetch flour and kneaded it together with the syrup and dried it. The syrup was beneficial for both [drugs] in the composition as a binder. The property of the syrup that disappears was the moisture from it, as it was dried in the shade for one day until it became a soft pastille. This *iqrās* was present in all remaining [i.e. later] theriacs. There was nothing missing from it, and it was also in the "greater theriac" attributed to Andromachus the Younger. The composition of the theriac is as follows. **It [the composition] is of extreme/utmost perfection.**

Page 9 (view 15)
note: there are some missing pages that precede this.

(table begins)
الغار مثقالان
الجنطيان أربعة مثاقيل
المر ثمنية مثاقيل
الزراوند ستة مثاقيل
العسل عشرون مثقالاً
(table ends)
وألف يوياغورس هذا الدرياق وقد أتت عليه من السنين ثمان وثلثون سنة وبقي يستعمل

[23] This is the number of years between the composition of the two theriacs (12+110+40+10=172).

(table begins)[24]
باقي حياته اثنين وثلثون سنة
والى ان ولد مارينوس الأول تسعين سنة
والى ان تعلم مارينوس عشرين سنة
والى ان ألف هو درياقه عشرين سنة
(table ends)
فذلك جملة ما بقي هذا الدرياق يستعمل منذ وقت ألف والى ما ابتداء مارينوس الأول فالف درياقه مائة واثنين وستين سنة*
فبرز مارينوس وقد أتت له من السنين عشرون سنة*
فنظر في الدرياقات المتقدمة التي الفها من تقدمه*
وكان رجلاً يجمع التجربة والقياس فما من رجلا الأ وقد اتى بشيء قوي المنفعة حسن التأليف*
فلم ينقص من ادوية هؤلاء شيآ*
وحصل*
ادوية هذا لدرياق هي أقراص الاسقيل وادوية مفردة وهي*
(table begins)
مر/ قسط/ جنطيان/ زراوند/ حب الغار/ دار صيني/ فلفل ابيض/ سليخة/ زعفران
(table ends)
وألف هو ايضاً زيادة تسعة ادوية مفردة وهي
(table begins)
سنبل هندي/ مشكطرامشير/ افراسيون/ اسطوخودوس/ فلفل اسود/ دار فلفل/فقاح الاذخر/ مقل ازرق/ حرمل
(table ends)

[the following is a partial recipe of Pythagoras' theriac]
(table begins)
laurel berries, two *mithqāl*s
bitterwort, four *mithqāl*s
myrrh, eight *mithqāl*s
birthwort, six *mithqāl*s
honey, twenty *mithqāl*s
(table ends)
Pythagoras composed this theriac at thirty-eight years of age and it continued to be used:
(table begins)
for the remainder of his life, thirty-two years
until Marinos the first was born, ninety years later
until Marinos was educated, twenty years later
until he composed his theriac, twenty years later
(table ends)
The sum [of years] that the theriac continued to be used since its composition [by Pythagoras] and until Marinos started the composition of his theriac is one hundred and sixty-two years.[25] Marinos emerged at twenty years of age. He examined the preceding theriacs that were written by his predecessors. He was a man that had both skills: empiricism and logic. All of the men [that is, the physicians] contributed with something that strengthened the benefits of the well-written composition. Thus, he did not omit anything from their [the physicians'] drugs. He

[24] The table is read from left to right.

[25] This number is calculated by adding the years in the preceding table (32+90+20+20).

obtained the drugs of this theriac, which include the *iqrāṣ al-asqīl* and the following simple drugs:
(table begins)
myrrh/ crepe ginger/ bitterwort/ birthwort/ laurel berries/ cinnamon/ white pepper/ Chinese cinnamon/ saffron
(table ends)
He also collected nine additional simple drugs as follows:
(table begins)
Indian spikenard/ Dittany of Crete/ horehound/ lavender/ black pepper/ long pepper/ citronella/ bdellium/ wild rue
(table ends)

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فاجتمعت ادوية ثمنية عشر دواء مفرداً وواحد مركب وهو العنصل وصارت منافع ذلك ستة عشر منفعة*
(table begins)
احدهن انه ينفع من لسع الحيات
والثانية انه ينفع من السموم المشروبة
والثالثة انه ينفع من الادوية القاتلة المشروبة
والرابعة انه ينفع من لدغ الرتيلاء
والخامسة انه ينفع من يقوي الرحم
والسادسة انه ينفع من وجع المفاصل
والسابعة انه ينفع من لدغ العقارب
والثامنة انه ينفع من ورم الطحال
والتاسعة انه ينفع من خفقان الفواد
والعاشرة انه ينفع من خلط البارد في المعدة
الحادية العشر انه ينفع من الخنازير
والثانية عشر انه ينفع من الدّوران
والثالثة عشر انه ينفع من الصفار
والرابعة عشر انه ينفع المفاصل ويقويها
والخامسة عشر انه ينفع من البواسير ومن النواصير في المقعدة والعين
والسادسة عشر انه ينفع من اللقوة
(table ends)
فصارت ادوية المركب منها سبعة عشر دواء وهي
(Diagram 4 follows)

The drugs became eighteen simple drugs and one compound [drug], the squill. The benefits of this reached sixteen.
(table begins)
First, it is useful for the bite of snakes
Second, it is useful for poisonous liquids
Third, it is useful for deadly liquid drugs
Fourth, it is useful for bite of a tarantula
Fifth, it is useful for strengthening the womb
Sixth, it is useful for joint pain
Seventh, it is useful for the bite of scorpions

Eight, it is useful for splenitis
Ninth, it is useful for palpitations of the heart
Tenth, it is useful for the cold humour in the stomach
Eleventh, it is useful for scruflosis
Twelfth, it is useful for dizziness
Thirteenth, it is useful for jaundice
Fourteenth, it is useful for strengthening the joints
Fifteenth, it is useful for hemorrhoids and fistula in the buttocks and the eye
Sixteenth, it is useful for facial paralysis
(table ends)
The compound medicine reached seventeen drugs[26] as follows
(see Diagram 4 translation)

Page 11 (view 17)

وكان تركيبه على هذا من الأوزان وهو ان يأخذ من هذه
(table begins)
أقراص الاسقيل: ثلثون مثقالا
ومر/ وفلفل الابيض/ وفلفل الاسود/ والدار فلفل: من كل واحد أربعة وعشرون مثقالا
جميعة تسعة وتسعون مثقالا
والجنطيان/ والحرمل/ والزراوند/ والمقل ازرق: من كل واحد ثمنية عشر مثقالا
جميعة اثنان وسبعون مثقالا
والمشكطرامشير/ والزعفران/ والافيون/ والسنبل/ والحب الغار: من كل واحد اثنا عشر مثقالا
جميعة ستة وثلثون مثقالا
وفقاح الاذخر/ واسطوخودوس/ ودار صيني/ وقسط/ وسليخة: من كل واحد مثاقيل من هذه الادوية
جميعة اثنان وعشرون مثقالا
العسل مثل جميع الأدوية: من كل واحد اربعة
سوى الأقراص المذكورة
(table ends)
فذلك الحاصل من الدوا المعجون أربع مائة وأربعة وتسعون مثقالاً
وكانت تختلف الشربات التي كان يسقيها*
وكأن يسقي للعلل التي في الرّاس نصف مثقال*
وللعلل التي في أسفل البدن مثقالاً واحدً*
وللعلل التي وسط البدن ثلثي مثقال*
فالف مارينوس هذا الدرياق وقد أتت عليه من السنين أربعون سنة
فبقي يستعمل هذا الدرياق أيام حياته ستين سنة والى ان ولد مغنس الحمصي ماتي سنة و الى ان تعلم عشرين سنة*
والى ان انتداء بتأليف درياقه ثلثين سنة*
فذلك جمله ما بقي هذا الدرياق يستعمل منذ وقت ما الفه مارينوس الى ما ابتداء بتأليفه*
ثم برز مغنس وقد أتت له من السنين عشرون سنة*
فبعد ان تدرب وقراء ثلثين سنة أخرى راي فيما ألفه الأوائل فمر به هذا الدرياق وكان قد اشتهر وكان الناس قاطبة يشرفونه والأطباء يصفونه ويحمدون فراي فيه أقراصاً فنظر في أقراص كان الفها رجل من مدينة الاذرخرون من بعض الجزائر الشريفة ببلاد اسيا محمودة العافية*
غرضه فيها هذا الغرض قوية كثيرة المنفعة حسنة التجربة*

[26] Seventeen is incorrect in this context. As stated above, there are a total of nineteen drugs in this theriac. The accompanying diagram (Diagram 4) also presents nineteen drugs.

فأراد ان يصيرها بأجمعها أحد ادوية هذا الدرياق*
وفيها ايضاً بعض ادوية هذا الدرياق*
فما كان مقدار أكبر نقصه من التاليف وما كان اقل وزاد عليه*

Its preparation was according to these measures:
(table begins)[27]
iqrāṣ al-asqīl, thirty *mithqāl*s
myrrh/ white pepper/ black pepper/ long pepper: of each one twenty-four *mithqāl*s
a total of ninety-nine *mithqāl*s[28]
bitterwort/ wild rue/ birthwort/ bdellium: of each one eighteen *mithqāl*s
a total of seventy-two *mithqāl*s
Dittany of Crete/ saffron/ opium/ Indian spikenard/ laurel berries: of each one twelve *mithqāl*s
a total of thirty-six *mithqāl*s[29]
citronella/ lavender/ cinnamon/ crepe ginger/ Chinese cinnamon: of each one four *mithqāl*s from these drugs
a total of twenty-two *mithqāl*s[30]
honey in the same quantity as all of the drugs
except the mentioned *iqrāṣ* (pastille)
(table ends)
He obtained four hundred and ninety-four *mithqāl*s[31] **for this medicinal electuary**. The doses he would give as a drink varied: he would give a drink of half a *mithqāl* for diseases affecting the head; and one *mithqāl* for the diseases affecting the lower body; and two-thirds *mithqāl* for diseases of the middle part of the body. Marinos composed this theriac when he was forty years of age. The theriac continued to be used for the remainder of his life, that is sixty years, until the birth of Magnus of Emessa, two hundred years later, and until he was educated, twenty years later. And until the beginning of the composition of his theriac, thirty years later. That is the sum [of years] that the theriac was used since the time Marinos composed the theriac until the beginning of Magnus' composition.[32] **Magnus emerged and became known at twenty years of age**. After he trained and read for another thirty years, he considered the compositions of his predecessors. He came across this theriac [of Marinos] which was well-known. All of the people respected it [the theriac], the physicians prescribed it, they praised it, and believed it to be safe from all ills. He wanted to add to this, to mix some of the drugs with the others, so that the medicine would be more efficacious. He examined the drugs, which were eighteen drugs, and saw in it a pastille. He examined the pastille that was composed by the man from the city of *al-*

[27] The reading of this table is the translator's interpretation.

[28] This might be a scribal error. It should read ninety-six *mithqāl*s (4x24). This error is not part of other manuscripts on this topic. See Kerner, "Art in the Name," 81.

[29] This should read sixty *mithqāl*s (5x12). Kerner does not provide a translation of the specific quantities.

[30] This should read twenty *mithqāl*s (5x4).

[31] This number is not consistent with Kerner's readings from other manuscripts. Kerner, "Art in the Name," 81.

[32] The gap between the two theriacs is three hundred and ten years (60+200+20+30).

adhar kharūn from some noble island in the land of Asia, the pastille praised for its efficacy.[33] His goal was a strong [medicine], many benefits, and good results. He wanted to make all of this as one of the drugs of this theriac. In it would also be other drugs of this theriac. Any large amounts [of the drug quantity], he reduced it in the composition. And what [drug] was less, he increased it.

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وصفتها يجري على هذا التاليف
(followed by a diagram of the *iqrāṣ* – see Diagram 5)

Its description follows this arrangement:
(see translation of Diagram 5)

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نسخة أقراص الاذروخرون يجري على هذا الأوزان أن يوخذ
(table begins)
زعفران/ مر/ اصل الكبر/ سنبل/ دار صيني/ سليخة/ زراوند/ فقاح الاذخر/ شيح جبلي/ جاشا: من كل واحد ستة عشر مثقالا
فوّة/ مصطكي/ حماماً/ قسط: من كل واحد عشرون مثقالا
قصب الذريرة/ جعده/ اسارون/ اقحوان/ عيدان البلسان/ دار شيشعان: من كل واحد ستة مثاقيل
جميعة أربعة وعشرون مثقالا
فذلك الجميع مائتا مثقال واثنان وعشرين مثقالا
(table ends)
وزاد على الثمانية عشر دوا عشرين دوا اخر
(table begins)
بزر الكرفس/ كمافيطوس/ ميعه/ مو/ حماماً/ ناردين/ أنيسون/ قلقطار/ سوس اسمانجون/ بزر الشلجم البري/ ورديابس/ فطراساليون/ صمغ البطن/ زنجبيل/ جعده/ أشقّ/ انزروت/ سورنجان/ جأوشير/ دوقو
(table ends)
وجعل منافع هذا الدرياق أربع وعشرون منفعة
(table begins)
احدهن انه ينقي المرّة السوداء وينظفها من البدن
والثانية انه يقوي الصلب ويزيد في الجماع
والثالثة انه ينفع من اورام الطحال اوجاعه
والرابعة انه ينفع من وجع اللثة والاسنان
والخامسة انه ينفع من ميل الارحام الى أحد الجوانب
والسادسة انه ينفع من الجزام
والسابعة انه ينفع من الوسواس السوداوي
والثامنة انه ينفع من فساد الذهن ويذكيه
والتاسعة انه ينفع من داء الثعلب وداء الحية
والعاشرة انه ينفع من الحمي الربعية
الحادية العشر انه ينفع من ابتداء السرطان
والثانية عشر انه ينفع من السعفة الجرب وفي العين
والثالثة عشر انه ينفع من الخنازير ووجع الأربية
والرابعة عشر انه ينفع من فساد المزاج المائل الى اليبوسة
والخامسة عشر انه ينفع من يسهل خروج الاجنة من بطون اماتها

[33] The praise (محمودة العافية) could be in reference to the pastille or the island.

والسادسة عشر انه ينفع من عضة الكلب الكلب
والسابعة عشر انع ينفع من نهش جميع الحيوانات السبعة
والثامنة عشر انه ينفع من لدغ الرتيلاء
والتاسعة عشر انه ينفع من لدغ الحيات ما عظم منها وما صغر
والعشرون انه ينفع من لسع جميع الحيوانات
والحادية والعشرون انه ينفع من شرب السموم كلها
والثانية والعشرون انه ينفع الفالج واللقوة
والثالثة والعشرون انه ينفع من خفقان الفواد
والرابعة والعشرون انه ينفع من كثرة الشيب
(table ends)

A version of *iqrāṣ al-adhar kharūn* is as follows.[34] From these measures, take:
(table begins)
saffron/ myrrh/ capers/ Indian spikenard/ cinnamon/ Chinese cinnamon/ birthwort/ citronella/ artemisia/ thyme: from each one sixteen *mithqāl*s
valerian/ mastic/ celandine/ crepe ginger: from each one twenty *mithqāl*s
sweet flag/ germander/ hazelwort/ feverfew/ balsam sticks/ spiny broom: from each one six *mithqāl*s
total of twenty-four *mithqāl*s [35]
the total of that is two hundred and twenty-two *mithqāl*s
(table ends)
To the eighteen drugs, he added twenty other drugs
(table begins)
wild celery seeds/ yellow bugle/ sweetgum?/ bearwort/ celandine/ Indian valerian/ sweet cumin/ yellow vitriol?/ liquorice?/ wild turnip seeds/ dried rose/ rock-parsley/ terebinth/ ginger/ germander/ gum ammonia/ sarcocolla/ autumn crocus/ opoponax/ candy carrot[36]
(table ends)
There are twenty-four **benefits** of this theriac:
(table begins)
First, it cleans the bitter liquid and removes it from the body
Second, it strengthens the loins and increases sexual desires
Third, it is useful for the swelling of the spleen (splenitis) and its pain
Fourth, it is useful for the pain of teeth and gums
Fifth, it is useful for the movement of the wombs to either side
Sixth, it is useful for colic (elephantiasis)
Seventh, it is useful for melancholy and anxiety (associated with Satan)
Eighth, it is useful for the corruption of the intellect and to strengthen the intellect
Ninth, it is useful for the disease caused by the fox and the snake
Tenth, it is useful for quartan fever

[34] The recipe that follows changes the measures of the drugs than the ones seen in the preceding diagram (Diagram 5). The author gives the recipes of both versions of *iqrāṣ al-adhar kharūn*. The first likely refers to the original version, and what follows is Magnus' version.

[35] Not sure what this total refers to. A good example to show that the table form was more important than the content.

[36] Some of the terms are translated from Persian.

Eleventh, it is useful for the beginning of cancer
Twelfth, it is useful for tinea and itchiness in the eye
Thirteenth, it is useful for scrufolosis and pain in the groin
Fourteenth, it is useful for bad temperament that occurs during old age
Fifteenth, it is useful for easing the delivery of the foetus from the mother's womb
Sixteenth, it is useful for the bite of a rabid dog
Seventeenth, it is useful for the bite of all predatory animals
Eighteenth, it is useful for the bite of tarantulas
Nineteenth, it is useful for the bite of large and small snakes
Twentieth, it is useful for the bite of all animals
Twenty-first, it is useful from the drink of all poisons
Twenty-second, it is useful for paralysis on one side of the body, and facial paralysis
Twenty-third, it is useful for the palpitations of the heart
Twenty-fourth, it is useful for the abundance of white hair
(table ends)

Page 8 (view 14): Diagram 6

Page 21 (view 27)

وكان تركيب ادويته على هذا من الاوزان وهو أن يأخذ من هذه الأدوية
(table begins)
أقراص الاسقيل/ أقراص الاذروخرون: ستة عشر درهما
حرمل/ سليخة/ فلفل اسود/ مقل/ قسط/ فراسيون/ مر/ ناردين/ انزروت/ اسطوخدوس/ ناردين: من كل واحد وزن ستة الدراهم* جميع ذلك ستة وستون درهما
المشكطرامشير/ كمافيطوس/ فقاح الاذخر/ سوس/ سنبل/ جعده/ دار فلفل/ زراوند/ ميعه/ دوقو: من كل واحد وزن اثني عشر دراهما* جميع ذلك مائة وعشرون درهما
زنجبيل/ ورديابس/ قلقطار محرك/ جأوشير/ صمغ البطن/ مو/ سورنجان/ أنيسون/ قطراساليون/ بزر الشلجم: من كل واحد وزن أربعة وعشرين درهما* جميع ذلك مائتان واربعون درهما
حب الغار/ أشقّ/ حماماً/ بزر الكرفس/ دار صيني/ جنطيان/ فلفل ابيض: من كل واحد وزن ستة عشردرهما* جميع ذلك مائة وثمنون درهما
فذلك الجميع ستمائة وستة الدراهم يعجن بوزنها العسل
(table ends)
تدبيرمغنس لهذا الدرياق يجري على هذا
ينقع منها ما انتقع ثم يسحقه ثم يطرح عليه الأدوية اليابسة مسحوكةً منخولةً*
ثم يدعه على النار لحظةً ويطرح عليه العسل بمقدار لا يحمي ويضربه وينزل به ويرفعه في اناء غضار سنة*
ثم يستعمل مقدار الشربة التي كان يامر بها لهذه اللعلل التي ذكرناها كلها وزن مثقال*
فالف مغنس هذا الدرياق وقد أتت له من خمسون سنة*
فبقي يستعمل هذا الدرياق أيام حياته اربعين سنة*
والى ان ولد اندروماخس مائة وعشر سنة*
والى ان تعلم عشرين سنة*
والى ان انتداء بتأليف هذا الدرياق بعد فهمه خمسة عشر سنة*
فذلك جمله ما بقي هذا الدرياق يستعمل الى ان ابتداء الى ان اندروماخس القديم العهد بتأليفه مائة وخمسة وثمنون سنة*
ثم برز اندروماخس وقد أتت عليه من السنين عشرون سنة*
فبقي خمسة عشر سنة أخرى متفكراً في اصلاح الدرياق*
وكان يقدم ذلك يؤخره الى ان وقعت هذه التجربة بالبحث الشديد*

فلما ان تبين امر الحيات صاد الحيات وعرف جيّدها من رديها وجربها وميّزها وجرب العقاقير الأخر فاضافها الى

The preparation for his medicine is according to these measures. For this medicine, he took:
(table begins)
iqrāṣ al-asqīl/ *iqrāṣ al-adhar kharūn*: sixteen dirhams.
wild rue/ chinese cinnamon/ black pepper/ bdellium/ crepe ginger/ horehound/ myrrh/ Indian valerian/ sarcocolla/ lavender/ Indian valerian: of each one, the measure of six dirhams; the total of this is sixty-six dirhams.[37]
Dittany of Crete/ yellow bugle/ citronella/ liquorice/ Indian spikenard/ germander/ long pepper/ birthwort/ sweetgum?/ candy carrot: of each one, the measure of twelve dirham; the total of this is one hundred and twenty dirhams.
ginger/ dried rose/ yellow vitriol?/ opoponax/ terebinthe/ bearwort/ autumn crocus/ sweet cumin/ rock-parsley/ turnip seeds: of each one, the measure of twenty four dirhams; the total of this is two hundred and forty dirhams.
laurel berries/ gum ammonia/ celandine/ wild celery seeds/ cinnamon/ bitterwort/ white pepper: of each one, the measure of sixteen dirhams; the total of this is one hundred and eighty dirhams. The total of six hundred and six dirhams is kneaded with an equal measure of honey.[38]
(table ends)
The arrangement (*tadbīr*) of Magnus's theriac is as follows:
He soaks from it all that needs to be soaked. Then he pulverizes it and he introduces into it the dry drugs, powdered and strained. Then he leaves it on the fire for an instant and introduces into it honey in the amount needed to bind it. He whisks it, removes it [from the fire], and stores it in a [greenish] clay vessel for one year. He uses the dosage that has been prescribed for these diseases that we mentioned, the measure of one *mithqāl* for all of them. Magnus composed this theriac when he was fifty years of age. This theriac continued to be used for the remainder of his life, forty years. Until Andromachus was born, one hundred and ten years later; and until he studied, twenty years; and until he composed this theriac after he comprehended it, fifteen years later. The sum [of years] that the theriac remained in use until Andromachus the Elder?[39] began to compose it is one hundred and eighty-five years. Andromachus emerged when he was twenty years of age. He contemplated on the improvements of the theriac for an additional fifteen years. He hesitated until the time that this experiment was strongly verified. When he discovered the issue of the snakes, he hunted the snakes and distinguished between the good and bad types. He tested them, classified them, and tested the other drugs.

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درياق مغنس حتى صيّره درياقاً واحداً ولقبه يالفاروق*
لأن جميع ما تقدم من الدرياقات تفرقت ادوية فيه*
فأن الذي نشط أندروماخس وأفرد حمته التاليف هذا الدرياق وألف الحم الأفاعي فيه هو ثلثة أسباب على غير تجريب وان كانت تجربة*
وهذا كلامه بلفظه قال*

[37] The ingredients of this table are read backwards in order to match them with their measures.

[38] In other manuscripts, a total of 600 dirhams is given. Kerner, "Art in the Name," 84.

[39] Likely a scribal error. This should read Andromachus the Younger.

التجربة الاولة انه كان يعمل معي في بعض ضياعي بالموضع المعروف بيورونوس حراثون يحرثون الأرض للزرع وكان بيني وبين الموضع زهاء فرسخين وكنت أبكر الى الضياع حتى انظر ما يعملون وارجع فاذا فرغوا*
وكنت احمل لهم معي على الدابة التي تحت الغلام زاداً وشراباً بالطبيب نفسهم ويتجلدون على العمل*
فمأزلت كذلك الى ان حملت لهم يوماً*
وهذا كلام اندروماخس بلفظه ايضاً
وكنت قد أخرجت ليلاً بستوقا ؟ فيه شراب مطيّن الرّاس لم يفتح وزاداً*
فلما أكلوا الزاد وقدموا الشراب فتحوا راسه فأدخل أحدهم الكوز ليخرج منه فنظر فاذا فيه افعي قد تفرق وتهرا فلم يذوقوه وقالو عندنا في هذه القرية رجل مجذوم يتمنى الموت فنسقيه منه حتى يموت ويكون لنا في ذلك اجراً اذا ارحناه من وصبه*
فمضوا اليه بزادٍ وسقوه من ذلك الشراب وظنوا انه لا يلبث يوماً*
فلما كان قرب الليل انتفخ نفخة عظيمة وبقي عليها الى الغداة*
ثم انه سقط عنه الجلد الخارج وخرج الجلد الداخل*
فلم يزل حتى صلب جلده وبراء وعاش زماناً طويلاً من غير ان يشكو علة*
حتى مات الموت الطبيعي الذي هو فناء الحرارة الغريزية*
وهو دليل على انه ينفع من الأوصاب الشديدة في الأبدان والأمراض العتيقة*

He added it to the theriac of Magnus so that he made one theriac and he called it "*al-fārūq*." This [the name] is because what they [the predecessors] presented in the theriacs had a different set of drugs. The zealous Andromachus was determined to compose this theriac. He composed it [using] viper flesh. There are three reasons how he discovered them without any testing [i.e., by chance], though they have been tested. In his [Andromachus'] own words, he says: "The first test was in some of my farmlands in a place known as Yūrūnūs. The farmers were ploughing the land for cultivation. Between me and this place was [a distance of] nearly two *farsakh*s.[40] I would go early to this place so that I could see what they [the farmers] were doing and I returned when they finished. I would carry for them food and drinks on a four-footed animal [driven by] a slave, to ease them and sustain them for work. This remained so until one day I carried to them ..."
And these are also Andromachus' own words:
"I left, at night, with a jar? of drink that had a mud-covered top and was unopened, and [some] provisions. When they [the farmers] ate the provisions and the drinks followed, they opened its top. One of them put in [the jar] a cup to draw [the drink] from it. He looked and found a snake inside it, in small pieces and dissolved. They did not taste it. They said: 'We have in our village a man suffering from leprosy who wishes to die.' We gave him [the sick man] a drink from it so that he would die, and we would be rewarded from Allah when we alleviate him from his chronic illness. They went to him with food and gave him the drink, and believed that he would not survive [past] that day. When it was close to nighttime, he [the sick man] swelled a great deal and he remained like this until the morning. Then the outer skin fell from him, and the interior skin rose to the top. He remained [like this] until he regained his strength and was healed. He lived for a long time without any complaints of disease, and until he died a natural death which extinguished his inner heat. And it is proof that it [the viper flesh] is useful for severe chronic illnesses in the bodies and for age-old diseases."

Page 5 (view 11)

والتجربة الثانية ان أخي يملويوس كان ماسحاً من قبل الملك على الضياع وكان كثيرا ما يخرج اليها في الأوقات الوعرة الردية في الصيف والشتاء*
فخرج ذات يوم الى بعض القري على سبع فراسخ*

[40] *farsakh* is a unit of distance equalling around four miles, also known as parasang.

فنزل ليستريح في أصل شجرة وكان حرّا شديدا فخافت منه نفسه*
فاجتاز به افعى فضربه في يده
وقد ألقيها على الأرض من شدة تعبه*
فانتبه يفزع وعلم أن الآفة قد لحقته ولم يكن به طرق على القيام لقتل الأفعى*
واخذه الموت والغشي والكرب فكتب وصية ومعها اسمه وعلقها في تلك الشجرة واستبسل للموت وكان قربه ماء فضلة يسيرة في الجرّة في أصل تلك الشجرة*
وكان قد غلبه العطش فشرب منه شرباً كثيراً ولم يلبث الماء في جوفه حتى سكن ما كان به ضربه الأفعى وبراء*
فأقبل ذلك متعجباً ولم يعلم ما كان في الماء فقطع خشبة من تلك الشجرة يمتحن بها الماء لأنه كره أن يفنسه؟ بيده*
فاذا فيه أفعى قد اقتتلا جميعاً وتهاويا*
واقبا أخي هذا وهو صحيح طول حياته وترك العمل الذي كان فيه*
واقتصر على ملازمتي وخدمتي*

"**The second experiment is that my brother, Yamlūyūs,[41] was** a land surveyor of the farmlands assigned by the kings. He would go to the farms a lot during difficult times in the summer and the winter. He left one day for some village, seven *farsakh*s [away]. He laid down for a rest at the base of the tree. The weather was very hot, and he was worried [about the extreme heat].
A snake passed by him and bit him on his hand. He threw it on the ground as he was very tired. He grew fearful and realized that he had caught the disease. He had no strength to get up and kill the snake. Sadness, fainting, and death overtook him so he wrote a will with his name and hung it on that tree and faced death bravely. Near him were some remains of water in a jar at the base of the tree. Thirst overcame him so he drank a lot from it. The water barely stayed in him [that is, it did not take very long] until he was relieved of the snake bite and was cured. He was amazed but he did not know what was in the water. He cut a piece of wood from the tree and investigated the water because he did not want to put his hands. He found snakes inside, both of which had killed one another and dropped dead. My brother came out healthy for the rest of his life and he left the work he was doing. He confined himself to my companionship and my servitude."

Page 6 (view 12)

وهذا دليل على انه ينفع من لسع الافاعي والحيات والسباع الضارية*
والتجربة الثالثة انه كان للملك بيولوس غلام وكان رديءً غمازاً لمازاً فيه كل بلاء*
وكان كبيراً عند الملك لخبثه وغمزه ولمزه*
وكان قد آذى جميع الناس فبعث عليه الوزرآ والقواد وغيرهم من الرؤساء ليقتلوه*
فلم يتهيأ لهم لكثرته عند الملك*
فأحتال لهم بعض الأطباع ان اذهبوا فاسحقوا وزن درهمين افيون واطعموه ايّاه في طعامه واسقوه في شرابه*
فان الموت السريع يلحق بالناس كثيراً*
فاذا مات حملتموه الى الملك وليست به جراحة ولا قلبة*
ثم انهم دعوه الى بعض البساتين فلم يتهيأ لهم ان يطعموه فسقوه ذلك في الشراب فلم يلبث قليلا ان الموت*
قالوا نتركه في بعض البيوت ونختم عليه ونوكل الفعلة بباب البيت حتى نمضي الى الملك نعلمه انه قد مات*
فجاءوه ليعبث بثقاته لينظرون اليه*
فلما صاروا بأجمعهم الى الملك وعرفوه*
اذ نظر الفعلة فاذا افعى قد خرج من بين الشجار ودخل البيت الذي فيه الغلام*
ولم يتهيا لهم ان يدخلون خلفه ويقتلوه لان الباب كان مختوماً

[41] A different name is used in the other *Kitāb al-diryāq* manuscripts. Kerner, "Art in the Name," 87.

And this is the proof that it [the viper flesh] is beneficial for the bite of the serpents, and the snakes and the predatory beasts.
The third experiment is that King Bayūlūs had a slave. He was ill-mannered and a slanderer; he was filled will evil. He was valuable to the king for his malice, gossip, and slander. He had hurt many people. So, the viziers, leaders, and other heads were issued to kill him. But this was not successful because he was favoured by the king. One of the doctors suggested to them a trick: "Go and crush opium, the measure of two dirhams, and feed it to him in his food and give him to drink in his beverage, as most people are overtaken by sudden death [because of this]. Once he dies, carry him to the king and he will not have any wounds or marks." Then, they [the viziers et. al.] invited him to one of the gardens. They could not feed him, so they gave him a drink of that [the opium] so it would not be long before his death. They said: "We left him in one of the houses, sealed it, and delegated the guards so that we can go to the king and inform him that he [the slave] had died." They arrived to him [the king] so he can send his confidants to look at him [the slave]. When they came to the king to inform him, at the same time the guards saw a snake come out from between the trees and the enter the house that the slave was in. **They [the guards] could not go behind the snake and kill him as the door was sealed.**

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عليه فلم يلبثوا ساعة الا والغلام
يصيح لما اقفلتم الباب اعيوني قد لسعتني افعى*
فمدّ هو الباب من داخل واعانه قوام البستان فكسروه وخرج وليس به قلبة*
الحديث في هذا يطول وان كان ليس هذا الموضعه*
وانما اخذنا حاجتنا منه*
وهو دليل على انه ينفع من شرب الأدوية القاتلة المهلكة*
تيقنت عندي هذه الأشيا في الدرياق الماخوذ عن المغنس الحمصي لحم الأفاعي*
وزدت فيه ادوية مركبة كثيرة مما يشاكل تلك الادوية وصيرته دریاقاً واحداً ودربته احسن تدبير واكمله*
اذ كان هذا الدرياق تكبه؟ الاوايل؟ على ان ينفع هذه المنافع*
وإذ كنّا قد ازمعنا ان يخلط في الدرياق لحم الأفاعي*
فلا بدلنا من تخيرنا اجناس الحيات وأيها الذي يستعمل منها وأيها الذي يتقى*
الحيات قاطبة ثلثة أصناف فمنها قوية جداً لها قوي تهلك سريعاً*
ومنها هينة ضعيفة لا يبالي بها*
ومنها معتدلة بين هذين*
وهي الأفاعي التي يختار لعمل الدرياق*

They stayed barely an hour when the slave cried loudly: "Why have you locked the door? Help me! A snake has bit me!" He pushed the door from inside and the custodian of the garden aided him. They broke the door and he left and he did not have any marks. This story is very long but this is not its place and we took from it [the story] what we needed. And this is the proof that it [the viper flesh] is beneficial from very deadly liquified drugs. I became certain of these things in the theriac taken from Magnus of Emessa, [along with] the flesh of the serpent. I added to it many compound drugs which are similar to the [previous] medicines, and I made it one theriac, and its arrangement is excellent and perfect …The predecessors? have described the usefulness of the theriac? Since we intend to mix the flesh of the snake in the theriac, we must

select the types of snakes which are to be used and those which must be avoided. **Altogether, there are three types of snakes**. Among them are very strong ones who are powerful, they kill quickly. Among them are also weaker-bodies ones which are not of significance. And among them, between these two, are moderate ones and these are the snakes that are selected for the making of the theriac.

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والحيات التي لها سم قوي تهلك سريعاً وهي تسعة وهذه وصفاتها
(table begins)
احدها ما يقال له موروس وهو البلوطي*
ردي السم جداً وهو يسلخ الجلد الذي يدنو منه وانما سميت بهذا لأنها تأوي تحت شجر البلوط لا غير
والثاني يقال له مقتبس وهو الأغبر
وهذا ليس يقتل من لسعه ولكن يقتل كل من راهُ و يسمع صفيرهُ
والثالث يقال له يغورس وهو الأصم
وهذا إذا لسع ابال الدم ولا يزال الدم يجري بالبول حتى يموت الانسان
والرابع يقال له منفوس وهو النفاث
وذلك انه اذا لسع جري الدم من لسعه من وقته ولا ينقطع خروجه حتى يموت الانسان
والخامس يقال له بيرس وهو المعطش
وهذا اذا لسع لا يشرب الذي لسعه مأ حتى يموت و كان من رآه الملسوع أخذه العطش حتى يموت
والسادس يقال له بيوبلس وهو المشاء
من اجل الذي من يلسعه هذا لا يمكنه ان يقعد بل يمشي حتى يسقط وينال من يمشي بعده ذلك الطريق الموت
والسابع يقال له بولون وهو الموحى
وهذا لا يخرج نابه حتى يموت الانسان
والثامن يقال له مرتقس وهو المهرّي
لأنه كما يلسع يجري من ساعة ويفت العصا[ب]
والتاسع يقال له تعنس وهو النيران لان الانسان إذا دنا منه اخرجته
(table ends)
وهذا تمام اجناس الحيات القوية السّم بأسرها وامّا الحيات المعينة وهي التي براء بالقرب
والأدوية والتدبير ستة اصناف
(table begins)
احدها يقال له مقروس وهو الأسود
وهذا يهيج في السنة شهرين حزيران وتموز وليس سمه بالردي ولكنه اذا لم يحلل بالأدوية قتل بعد شهر
والثاني يقال له ميوس وهو الأغبر
وهو اقل سماً من الأول وهذا يقتل بعد شهرين
والثالث يقال له فيوس وهو الأبرش
وليس هذا اكثر السم وهو يقتل بعد أربعين يوماً
والرابعة يقال له موسلس وهو الأخرس
وسم هذا فيه حدة يسيرة ويشبه بالقتال الّا إذا بادروا في التدبير
والخامس يقال له من جنس الحيات الصغار التي هي في البيوت
وليس في هذه سم الا اليسير وله ويح لا يبالي به
والسادس من حيات الماء وهذه أيضاً لا يبالي بها وهي أقرب من الحيات الصغار
(table ends)

The snakes which have a strong poison kill quickly. They are nine [in number] and their description is as follows:
(table begins - written on a vertical plane)
The first is called Mūrūs and it is "the oaken." Its poison is very deadly and it strips one's skin as it approaches you. It is called this name [i.e. oaken] because it only seeks shelter under the oak tree.
The second is called Muqtabas and it is "the dark."[42] It does not kill through biting, rather it kills all those who look at it and hear its whistling.
The third is called Yagūras and it means "the deaf." When it bites, blood and urine keep flowing, until the person dies.
The fourth is called Manfūs and it means "the sprayer." When it bites, blood will keep running from [the site of] the bite immediately, and the person will not stop bleeding until they die.
The fifth is called Bayras and it is "the one who causes thirst." When it bites, the one who has been bitten will be unable to drink until he dies. Those who see the bitten person also become thirsty and die.
The sixth is called Bayūblis which means "the one who walks a lot," because whomever the snake bites, they cannot sit and continue to walk until they fall. Those who walk on that same path also die.
The seventh is called Būlūn which is "the oracler/magician." His fangs remain inside [the skin] until the person dies.
The eighth is called Murtaqas which is "the one who frays," because when it bites, the nerves? are immediately frayed.
The ninth is called Ta'nas which means "the fiery," because if a person approaches it, they will be burned.
(table ends)
This is the end of the types of snakes with strong poison.
As for the insignificant snakes, which can be cured by closeness(?) and medicine, and arrangement(?), **they are of six types**.
(table begins - written on a vertical plane)
The first of it is called Maqrūs and it is "the black." It becomes active for two months in the year, June and July. Its poison is not deadly but if it is not treated with medicine, it can kill after one month.
The second is called Mayūs and it is "the dark." Its poison is less than the first one and it will kill after two months.
The third is called Fayūs and it is "the spotted/speckled." It does not carry much poison and it kills after forty days.
The fourth is called Mūsalus and it is "the mute." Its poison has little strength and it is similar to the killer, except if one attends [to the bitten person] right away.
The fifth is a type of small snake which lives in houses. It carries very little poison, and its pain[43] is not significant.
The sixth is a type of water snake. It is also not of importance and it is close to the type of small snakes.
(table ends)

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[42] The word can also mean "the dirty."

[43] وبح can also be read as sound.

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فاما الأفاعي فمنها الافاعي تسمى
(table begins)
منها الدّسباء هذه اِما ان يكون رمادية اللون واما خضرا وهذه صورتها
ومنها افاعي تسمى الخطافية لانها تشبه الخطافي وهذه صورتها
ومنها افاعي تسمى النفاثة من أجل انها تفث السم في الشيء تفثاً وهذه صورتها
ومنها الجاورسية لأنها تشبه الجاورس وهذه صورتها
ومنها افاعي تسمى النحاسية لأنها تشبه النحاس وهذه صورتها
ومنها ما لونه لون الرمل وهذه صورتها
ومنها التي لها قرنان على راسها وتسمى الوزير لأنها تشبه وزيرالملك وهذه صورتها
ومنها ما فيه نقط سود وبعض بيض وهذه صورتها
ومنها ما لها ثلثة قرون وتسمى الملك وهذه صورتها
ومنها ما تسمى المزراقية وذلك لأنها تثب على الشي بمنزلة المزراق الذي يرمى به وهذه صورتها
ومنها حمر تسمى الدمية وهذه صورتها
ومنها ما فيه نقط سود مفردة وهذه صورتها
ومنها ما لها راسان وهذه صورتها
(table ends)
يجب ان ينقي: الأسود * والأصفر * والذي يشبه الرماد * والخطافية * والنفاثة * والجاورسية * والنحاسية * والقرنية * والملكية * والنقطية * والتي في بطونها قشور صلاب * والمزراقية * والسود التي * لها راسان *
ما ينبغي ان يختار لعمل الدرياق من هذه الأفاعي

As for the serpents, among them are serpents that are called:
(table begins; each description is paired with an illustration)
Among them are al-Dasbā'.[44] It can be either ash-gray in color or green and this is its image.
Among them are serpents called al-Khaṭāfiyya because they are similar to a hawk, and this is its image.
Among them are serpents called al-Nafātha because it sprays poison on things, and this is its image.
Among them are al-Jāwarsiyya because it is similar to *al-jāwars*? and this is its image.
Among them are serpents called al-Naḥāsiyya because it is like copper, and this is its image.
And among them [are ones] with the color of sand, and this is its image.
And among them are those that have two horns on its head and it is called "the minister" because it resembles the minister of the king, and this is its image.
And among them [are ones with] black dots and some with white dots and this is its image.
And among them [are ones with] three horns which are called "the king," and this is its image.
And among them [are ones] called al-Mazrāqiyya because they can jump/leap on things like a spear used for throwing, and this is its image.
And among them are the red [ones] that are called al-Dumiya,[45] this is its image.
And among them [are those] which have single/isolated black dots, and this is its image.
And among them [are those] that have two heads, and this is its image.
(table ends)

[44] The word literally means one who can bury itself.

[45] The word literally means the bloody ones.

It is necessary to select:[46] the black; the yellow; those that resemble ash; al-Khaṭāfiyya; al-Nafātha; al-Jāwarsiyya; al-Naḥāsiyya; al-Qarniyya; al-Mulūkiyya; al-Nuqṭiyya; those with hard scales on their backs; al-Mazrāqiyya; the black ones that have two heads.
What to choose from these serpents for the making of the theriac.

Note:
This page is followed by three pages of text that outline the preparation of viper pastilles: Page 26 (view 32); Page 61 (view 67); and Page 62 (view 68).

Page 65 (view 71)
Diagram 7, full-page composition
(quadrilateral enclosure)

مجمع الادوية اليابسة التي في هذا الشكل سبعون دوا وهذه السبعون الدوا والثاثة الأقراص يولف منها اندروماخس تغمده الله برحمته معجون الدرياق ولقبه بالفارق وهو في غاية الاعجاب والجودة

the total of dry drugs (in this composition/diagram (*shakl*) is seventy drugs. And these seventy drugs and three pastilles (*iqrāṣ*) are combined with Andromachus' – may God have mercy on him – electuary of the theriac (*ma'jūn al-diryāq*), known as al-faruq (*al-fāriq*). And it is of utmost wonder (*ghāyat al-'ajāb*) and splendor (*al-jawda*).

(outermost circular enclosure)

ميمون الابتداء
مبارك الانتهاء

auspicious beginning
blessed ending

(the spokes/radial lines of the diagram. they are read clockwise starting from the top of the circle. The numbers are added in for ease of referencing the English translation given below)

1	زعفران	ينفع من الفالج واللقوة
2	زنجبيل	ينفع من تغير المزاج الفاسد
3	مو	ينقي الرحم وعروق الصدر
4	دهن البلسان	ينفع الذين يشربون خبث الحديد
5	رب السوس	ينفع من عرق النساء
6	غاريقون	ينفع من لسع الهوام
7	اصل السوس	ينفع من غائلة السم
8	ثوم بري	ينفع من غائلة السموم
9	بزر الشلجم	يسكن العلل الباردة ويقوي البدن
10	الورد	ينقي البدن ويقوي المعدة
11	جاوشير	ينقي البدن ويدر اللبان والحيض
12	دار صيني	يحط من الراس الادوا الردية
13	زراوند	ينفع من السموم القاتلة
14	قنطورون	ينفع من جميع العلل السوداوية
15	قفر اليهود	ينفع من الأدوية القاتلة
16	اقاقياء	يقوي البدن وينقيه
17	جند بيدستر	ينفع من لسع العقارب

[46] The word used in the text is يتقي which means to avoid. The context suggests the word ينقي

18	انيسون	يدر البول وينقي المثانة
19	فلفل اسود	ينفع من اوساخ البدن والرحم
20	أشق	ينفع من الخنازير
21	حرمل	ينفع من الشنج
22	صمغ	يصلح الأدوية
23	سورنجان	ينفع من اوجاع المفاصل
24	قردمانا	ينفع من لسع العقارب
25	مصطكي	ينفع من الكسر؟
26	اصل الكبر	ينفع من السموم القاتلة
27	هوفاريقون	ينفع من حدة السموم
28	ورق الساذج	ينفع من وجع الكبد والطحال والأمعاء
29	حب البلسان	ينفع من وجاع الراس والقسقه؟
30	قنه	ينفع من عرق النساء
31	دوقو	ينقي البدن من اخلاط الردية
32	فو	ينفع من الرياح الغليظة المعاء
33	حماما	ينقي البدن والكبد والكليتين ويسهل الحيض
34	الوج	ينفع من السموم القاتلة
35	زاج مشوي	ينفع من الادوية الحارة المشروبة
36	طين مختوم	ينفع الخلع والكسر في بعض الاعضاء
37	بزر الرازيانج	ينفع من السدد ويقوي المعدة
38	جنطيان	يضاد السموم المفرغة في البدن من السباع
39	مر	ينفع من الاوجاع الباردة
40	شيح جبلي	ينفع من لدغ ذوات السموم
41	ناردين	ينفع من الاستسقاء والشنج والعصب
42	لحية التيس	يحفظ على البدن مزاجه الطبيعي
43	كما فيطوس	يقاوم السموم القاتلة
44	نانخواه	ينقي الكبد ويدر البول
45	حرف	ينقي الرحم ويسهل الحيض
46	سساليوس	ينقي الكبد والصدور والعروق
47	اسارون	ينفع السدد وينفذ الأدوية
48	بزر الكرفس	يفتح السدد وينفذ الأدوية
49	مقل	ينفع الذين يشربون المرتك
50	لبني	ينفع من فساد المزاج
51	جعده	يحط من الراس البلغم
52	عود البلسان	يقوي البدن والراس
53	سنبل	ينفع من البلغم اللزج
54	سليخة	ينفع من لسع الأفاعي
55	سكبينج	ينفع من أنواع البلغم والسوداء
56	صمغ البطن	ينفع من النقرس ووجع المفاصل
57	فقاح الاذخر	ينفع من الفالج واللقوة
58	كندرذكر	يضاد الأدوية المشروبة
59	مشكطر امشير	ينفع من الماء في العين
60	افيون	يضاد الأدوية الحارة ويسبت
61	دار الفلفل	ينفع من الفالج واللقوة
62	فلفل ابيض	ينفع من البلغم اللزج العارض في الورك
63	قسط	ينقي الكبد والطحال والرحم

64	استوخدوس	يقوي أعضاء الجوف
65	بزر كرفسي جبلي	يبقي الكبد والكلي والمثانة
66	حب الغار	يكسر حدة السموم
67	فراسيون	ينفع من الجذام والسوداء
68	فنذج جبلي	ينفع من النافض والحمى الربع
69	فنجنكشت	يدر الطمث وينفع من الورم في الكبد
70	راوند	ينفع من حدة السموم

1	saffron	beneficial for paralysis (of one side) and facial paralysis
2	ginger	beneficial for changing the bad temperament
3	bearwort	cleans the womb, veins and chest
4	balsam oil	beneficial for the drinking of (poisonous) liquid iron refuse
5	liquorice juice	beneficial for sciatica
6	agaric	beneficial for the bite of gnats (poisonous)
7	liquorice root	beneficial for the effects of poison
8	wild garlic	beneficial for the effects of poisons
9	wild turnip seeds	pacifies diseases that are cold (in nature) and strengthens the body
10	rose	clears the body and strengthens the stomach
11	opoponax	clears the body and increases (the flow of) the milk and menstruation
12	cinnamon	removes harmful drugs from the head
13	birthwort	beneficial for deadly poisons
14	centaury/ knapweed	beneficial for all of the diseases related to melancholy
15	Jew’s pitch/ asphaltum	beneficial for poisonous drugs
16	acacia	strengthens and purifies the body
17	castoreum	beneficial for the bite of scorpions
18	anise	increases (the flow of) urine and clears the bladder
19	black pepper	beneficial for dirt in the womb and body
20	gum ammoniac	beneficial for scruflosis
21	wild rue	beneficial for cramps
22	gum [Arabic]	repairs medicine
23	autumn crocus	beneficial for joint pain
24	cardamom	beneficial for the bite of scorpion
25	mastic	beneficial for broken bones?
26	capers	beneficial for deadly poisons
27	St. John’s wort	beneficial for the sharpness of poison
28	Malabar cinnamon	beneficial for pain in the liver, spleen, and intestine
29	balsam berries	beneficial for pain in the head of …?
30	galbanum	beneficial for sciatica
31	candy carrot	cleans the body from harmful humors
32	valerian	beneficial for harsh intestinal gas
33	celandine	purifies the body, liver, kidneys, and eases menstruation
34	sweet flag	beneficial for deadly poisons
35	cooked vitriol	beneficial for hot drugs that have been drunk

36	terra sigillata	beneficial for displaced or broken bones in some parts of the body
37	fennel seeds	beneficial for blockage (of veins) and for strengthening the stomach
38	bitterwort	fights the poison injected into the body by the predatory vermin
39	myrrh	beneficial for cold/light pain
40	artemisia	beneficial for the bite of poisonous creatures
41	Indian valerian	beneficial for edema, cramps, and nerve pain?
42	goat's beard	keeps the body in a stable state
43	yellow bulge	resists deadly poison
44	ajwain/ carom seeds	clears the liver and increases (the flow of) urine
45	water cress	clears the womb and eases menstruation
46	sweet cicely	clears the liver, the chest, and the veins
47	hazelwort	beneficial for blockage and (allows) the drug to enter
48	smallage/ wild celery	opens any blockage and (allows) the drug to enter
49	bdellium	beneficial for those who drink litharge
50	storax	beneficial for bad temperament of the body
51	germander	removes the head of the phlegm
52	balsam sticks	strengthens the body and the head
53	Indian spikenard	beneficial for sticky phlegm
54	Chinese cinnamon	beneficial for the bite of the snake
55	sagapenum	beneficial for different types of phlegm and for melancholy
56	terebinthe	beneficial for gout and join pain
57	citronella	beneficial for paralysis (of one side) and facial paralysis
58	frankincense	fights against the drugs that have been drunk
59	Dittany of Crete	beneficial for water in the eye (glaucoma)
60	opium	fights against hot drugs and makes them dry
61	long pepper	beneficial for paralysis (of one side) and facial paralysis
62	white pepper	beneficial for occasional sticky phlegm in the thigh?
63	crepe ginger	clears the liver, spleen, and womb
64	lavender	strengthens the organs below the chest
65	mountain celery seeds	clears the liver, kidneys, and the bladder
66	laurel berries	reduces the effects of the poison
67	horehound	beneficial for leprosy and melancholy
68	wild marjoram	beneficial for shivering and quartan fever
69	chaste tree	increases (the flow of) menstruation and is beneficial for inflammation in the liver
70	rhubarb	beneficial for reducing the effects of poison

(the circular enclosure wrapping outside the radial lines, read clockwise from the top of the circle)

هذه الخمسة يؤلف منها ابراس اقراصاً بسمها أقراص الزنجبيل ويذكر انها ينفع من جميع اوجاع المعدة والطحال

هذه الأربعة يؤلف منها ابراس حبا يسميه حب الغاريقون ويسقي منه

هذه يؤلف منها منقيلوس حبا يلقبه حب المش يسقيه؟ لجميع الاوجاع اليابسة والرطبة وهذا دليل على استعمال الادوية

هذه الخمسة عشر الدوا يؤلف منها ماغينوس ويلقبه بمعجون الجاوشير وذكر انه ينفع من جميع اوجاع السموم وجميع اوجاع البدن السوداوية ومن الصداع والوسواس

هذه العشرة يؤلف منها افريطن حبا يسمه حب الساذج يسقيه من العلل الباردة والسوداوية وهذا دليل على استعمال الادوية

هذه الأربعة يؤلف منها سابورس معجونا يلقبه بمعجون الأربعة يستعمله في لدع الحيات ويذكر انه ينفع من جميع الاوجاع الباردة ويدر الحيض

هذه الأربعة عشر دواء سماء حب المفاصل الكبير النافع من جميع وعرق النساء والنقرس وهذا دليل على ان الادوية المفردة لا يبلغ مبلغ الادوية

هذه الادوية يؤلف منها دوليس حبا يسميه حب المثلث يسقيه بجميع اوجاع اللقوة لاسيما اذا كان في اعلى البدن

هذه الأربعة عشر الدواء هي ادوية مفردة يؤلف منها ميرويس دوا يسميه معجون الملك كان يستعمله الملك في وقت غذائية لعلل كانت به

From these five,[47] Abrās composed pastilles known as the pastille of ginger. He mentions that it is beneficial for all of the pains in the stomach and the spleen.

From these four, Abrās composed pastilles called pastilles of agaric, of which a drink is given.

From these, Manqaylūs composed pastilles which are called the pastille of *al-mash yasfihi*? … [they are beneficial for] all of the pains [related to] dryness and moistness. This is the proof of the usage of this medicine.

From these fifteen drugs, Magyanūs composed a medicine and called it the electuary of opoponax. He mentioned that it is beneficial for all of the pains of the poison, and the melancholic pains of the body, and for headaches, and anxiety.

From these ten, Afrīṭan composed pastilles which he called pastille of *sādhij* (cinnamon?). He gives a drink of this for cold and melancholic diseases. This is the proof of the usage of this medicine.

[47] The names of the drugs are not mentioned as oftentimes it was challenging to decipher the drugs that the scribe was referencing.

From these four, Sābūras composed an electuary, which he called the electuary of the four. He used it for the bite of snakes and he mentioned that it is beneficial for all of the pains related to coldness and for increasing menstrual flow.

From these fourteen drugs, Abrqalīs composed pastilles and he called the great pastille of joints, beneficial for pains of the joints and sciatica and gout. This is the proof that the simple drugs cannot reach the level of compound drugs.

From these drugs, Dūlīs composed pastilles which he called pastille of the third. He gave of it a drink for all of the pains related to facial paralysis especially if it is in the upper part of the body.

From these fourteen drugs, which are simple drugs, Mayrūyis composed a medicine. He called it the electuary of the king as it was used by the king during lunch for some of his diseases.

(phrases inscribed in the innermost circles)

وهذه السبعون الدوآء والثلثة الأقراص يؤلف منها اندروماخس معجون الدرياق ولقبه الفارق

الادوية الواردة من خارج على بدن الانسان ليعلم ان كل واحد منها يتصل بأخيه

From these seventy drugs and three pastilles, Andromachus composed the electuary of the theriac and called it *al-Faruq*.

He knows that the drugs outside? the human body, each one is connected to its brother?

Page 66 and 67 (view 72 and 73)
Diagram 8, double-page composition (select translations)

(framed in blue)

أقراص الأفاعي ايضاً فيه

(framed in red)

تأليف الأدوية هذا الدرياق واقراصه وتأليف منافعه على هذا

(text inside the innermost rectangle)

وذلك ان الأدوية المفردة تالف ويخرج عن تاليفها مزاج اخر ومنافع اخر ليس هو ولا واحد منها
وذلك ان تاليف ادوية إذا اجتمعت تفرق كل واحد منها الى ما يشاكله ويطاوعه و يعاونه في اصلاح البدن
وينقي الامراض عنه ويرده الى حالة الصحة التي خرج عنها وذلك عن الدواء الواحد من الأدوية المفردة
التي في معجون له هو في نفسه خاصية منفعة وإذا اجتمع مع غيره كان في اجتماعها منفعة أخرى مع
ذلك وأخرى اذا اجتمعت معه الادوية ان شاء الله وهو الكافي الشافي المعافي وهو حسبي

The viper pastilles are also in this

The composition of the drugs in this theriac and in its pastilles and the composition of its benefits are as follows.

When the simple drugs are mixed, its composition will result in a different temperament and different benefits, which cannot be found in any one of the drugs [when used in isolation]. When the drugs in this composition are united/mixed together, each one will propagate to the drug that is similar to it and will cooperate with it in order to repair the body. It will remove the diseases and bring back [the body] to a healthy state. This is so because each drug of the simple medicine, which is in the electuary, has a beneficial property (*khāssiyya*). When you combine with others, its combination has other benefits, and different benefits when combined with other medicines, God willing. He is the protector, the healer, and He is sufficient.

Page 68 and 69 (view 74 and 75)
(in blue across the two pages)

وفي هذا الدرياق الكبير احدى وتسعون منفعة وهي هذه

In this great theriac, there are ninety-one benefits, and they are as follows

(in red across the two pages)

وهذا الدرياق المنسوب الى اندروماخس القديم العهد

This is the theriac attributed to Andromachus the Elder[48]

(the two pages outline the ninety-one benefits in a tabular form)

Page 70 (view 76)

فاذا أجمعت عندك الادوية الثلثة والاقراص وهي أقراص الاسقيل وأقراص الافاعي واقراص الأذروخرون السبعون الدوا المفردة
واخذ منها على هذه التي وصفها لك
(table follows)
فذلك جميع الدرياق المعمول الف وثمان مائية وأربعة وعشرون مثقالا

When you combine the drugs you have three pastilles, and they are *iqrāṣ al-asqīl*, *iqrāṣ al-afā'ī*, and *iqrāṣ al-adhar kharūn*, and seventy simple drugs.
Take from these [in the manner in] which we describe to you [below]
(table follows)
The entire, complete theriac is one thousand eight hundred and twenty-four *mithqāl*s.

Page 63 and 64 (view 69 and 70)
(only the title has been translated)

صفة خلط الدرياق وعجنه

The description of the mixture and its kneading

Page 71 (view 77)
(only the large, Kufic script translated)

وعمل بعضها الى بعض واحتال بعضها على بهض وقبل بعضاً بعض
كملت فيه المنافع الاحدى وتسعون
ترتيب ادوية هذا الدرياق يجري على ست مراتب اذا كان في الأناء

[48] A scribal error in the name, as this theriac is attributed to Andromachus the Younger.

They work with one another, and they interact with one another, and they come closer to each other.
The benefits of the complete theriac are ninety-one.
The rank of the drugs in this theriac are according to six ranks if it were in the vessel.

Page 72 (view 78)

(vertical table begins)
احدهن المرتبة الأولى
احديهن المرتبة الأولى وهي الحافظة للأدوية بمنزلة العسل
الحافظ لجميع الادوية المفردة والاقراص ومقام هذا المقام
الخندق والحصون لانه البارز من جميع الادوية يتشبه بالحصن
والثانية المرتبة التي
للأدوية المفردة كلها التي في نفس النسخة وهذه تفعل فعلين
احدهما يصلح الدوأ الذي من اجله صار هذا الدرياق وهي لحم الأفاعي
والآخر ما تفعله هي بنفسها من اشفائها الأمراض ونفي الاسقام عن البدن
والثالثة المرتبة التي
فيها أقراص الأدوروخرون وهي الحافظة لها في جوفها
من الدوآء الكبير وهي التي تحفظ قرصين في جوفها وتحوطهما
ومقدار هذه مقدار البوابين والحجاب
والرابعة المرتبة التي
هي الغاية وقصد الطلب اليها وهي مرتبة الملك الأعظم
الذي جميع ما اعددنا انما هو يدفع عن الملك السوء
ويحفظه ويحوطه منزلة اقراص الأفاعي
الخامسة المرتبة التي
هي كالذي مع الملك يحفظه من داخل ويساوره ومقامه معه
مقام غلمان الحجر لا يفارقونه بمنزلة أقراص الأسقيل
والسادسة المرتبة التي
هي كالعبيد الذين في دار الملك والمتعلمين لامره خاصةً الذين يحوطونه من داخل
كما يحوطونه اوليك من خارج بمنزلة المطبوخ
(table ends)

شكل الاناء الذي يمتزج فيه
الادوية على هذا وهي تسعة؟ مراتب يحيط به وهو يشتمل على ما بيناء
الذي يحلل الاناء العسل وبعده ساير الادوية المفردة*
وبعد ذلك أقراص الاذروخرون*
وبعد ذلك اخلاط أقراص الافاعي*
وبعد ذلك أقراص الاسقيل*
وبعد ذلك المطبوخ لأنه غواص*
وهو أحل الادوية وهو الذي ينحل ويمازج الادوية*
فحصل من ذلك ان الادوية اليابسة تسعون دواء وما في الأقراص من الادوية*
أربعة وعشرون دواء*
والأدوية السايلة*
دواءان*
وشكل الدائرة يجري على هذا

(vertical table begins)
The first rank is that of the preserver of the drugs, the rank of honey. It is the preserver of all simple drugs and the pastilles. The value [of honey] is equivalent to that of the trenches and the forts because it [the honey] is the most prominent of all the drugs, and it resembles the fort.

The second rank is that of all the simple drugs. It does two things: the first is that it repairs the medicine, and that is the viper flesh?; the second, which it does by itself, is that it heals the diseases and removes any maladies from the body.

The third rank is that of *iqrāṣ al-adhar kharūn*. It is the preserver that resides within the great theriac and it preserves the two pastilles inside it and surrounds it. The value [of this rank] is like that of the gatekeepers and guards.

The fourth rank is our goal, and it is the rank of the greatest king. All that we have prepared is to eliminate the evil/malady of the king, to protect him, and to surround him [with care]. This is the rank of the *iqrāṣ al-afā ʿī*.

The fifth rank is like those who are with the king, protecting him from the inside and entertaining him. Its position is the same as that of the youth, who do not leave him [the king]. This is the rank of *iqrāṣ al-asqīl.*

The sixth rank is like those of the slaves in the king's palace, those who obey him [the king], especially those who surround him from the inside and those who surround him outside. This is the rank of the *maṭbūkh* (cooked viper flesh).
(table ends)

The shape of the vessel? in which the drugs are mixed is as follows. They are nine? ranks that surround it and it includes what we explained.[49]
One which dissolves in the vessel, the honey, and after, the rest of the simple drugs. After that, *iqrāṣ al-adhar kharūn*. After that, the mixture of *iqrāṣ al-afā ʿī*. After that, *iqrāṣ al-asqīl*. After that, the *maṭbūkh*, as it is the diver [the one that penetrates deeply]. And it [the *maṭbūkh*] is the one that is the most dissolving of the drugs, and it mixes the drugs. The result of this is ninety dry drugs and twenty-four drugs in the pastille, and two liquid drugs.
The shape of the circle is as follows.

Page 53 (view 59)
Diagram 9

(the quadrilateral enclosure)
مجمع الادوية اليابسة التي في هذا الشكل وما في الأقراص منها ستة وستون دوا وهذا الدرياق منسوب الى الحكيم امين الأرواح اندروماخس تغمده الله سبحانه بالمغفرة والرحمة

[49] The scribe only explicated six ranks as discussed above.

the dry drugs in this composition/diagram (*shakl*) and in the pastilles are sixty-six.[50] And this theriac is attributed (*mansūb*) to the physician/sage (*al-ḥakīm*), guardian of souls (*amīn al-arwāḥ*) Andromachus, to whom may God, praise be to God, extend his forgiveness and mercy.

(the innermost circles)

خبز السميد/ لحم الافاعي (in black)
بصل العنصل/ ودقيق الكرسنة (in red)

semolina bread / viper flesh
scilla onion / vetch flour

Page 30 (view 36)

امتزاج الادوية يقع بحسب قوت الادوية المطبوخة ومطاوعة بعضها لبعض ولولم يكن ذلك كذلك لم يحتج الى الصبر الى معجونات حتى ينضح ويطبخ*
يختلط ويحدث عن تركيبها بطول الزمان مزاج آخر*
ولو لا ذلك لقد كانت ينبغي ان يمتزج في وقتٍ واحدٍ ويستعمل*
وأول ما يمتزج ويبتدئ من هذه ويذعن بعضه لبعض ويكسر بعضه حدة بعض ويستوي بالممازجة والانكسار والتاليف*
وهي تسعة ادوية
المطبوخ* دقيق الكرسنة* وخبز السميد البابس* والدار الصيني* وصمغ البطم* والدار فلفل* والسليخة* والجعدة* والعسل*
فأول ما يبتدئ من ذلك بالممازجة وذلك بعد ستة أشهر وهو المطبوخ لأنه يجري فاذا اجري رطب معه دقيق الكرسنة*
وأول ما يطاوعه ويذعن معه دقيق الكرسنة وذلك بالطبع*
ثم بعد ذلك يطاوعه ويذعن له خبز السميد البابس*
ثم بعد ذلك الدار الصيني لأنه أقرب الى طبيعة الخبز*
ثم بعد ذلك صمغ البطم لأنه سيال*
ثم بعد ذلك الدار فلفل*
ثم بعد ذلك السليخة*
ثم بعد ذلك الجعدة*
ثم بعد ذلك في آخر الأمر اذا تمازجت هذه كان فيها دوآ واحد رطب والباقية يابسة*
ساعدها بالرطوبة واليبوسة*
والامتزاج الطبيعي العسل*
ومن وقت ابتدآء امتزاج هذه والى منتها الامتزاج ستة أشهر*
ابراس كان يؤلف من هذه السبعة؟ من الادوية معجونا

The mixture is dependent on the strength of the cooked drugs, and the obedience/interaction of the drugs with one another. If this is not the case [i.e., the desired strength has not been achieved], one need not wait for the electuary until the time that it is cooked. They mix as a result of their composition [that takes] a long time, [giving rise to] a new mixture. If that is not the case, it is necessary to mix once and then use. The first [set of drugs] that mixes and, and obeys/interacts with the other drugs, and breaks the sharpness of the other, and is cooked through this mixture, and breaks [the other drugs], **they are nine drugs.**

maṭbūkh (cooked viper flesh)/ vetch flour/ dry semolina bread/ cinnamon/ terebinth/ long pepper/ Chinese cinnamon/ germander/ honey. The first that begins this mixture, after six months, is the *maṭbūkh*. This is because when the *maṭbūkh* flows, it penetrates and moistens the vetch flour. The first to obey/interact [with the *maṭbūkh*] is the vetch flour because that is its nature. After

[50] The number 66 in not commensurate with the number of drugs presented in the diagram.

that, the dry semolina bread obeys/interacts with it [the mixture]. After that, the cinnamon because it is closest in nature to the bread. After that, the gum of terebinth because it is in liquid form. After that, long pepper. After that, Chinese cinnamon. After that, germander. Finally, once they [the drugs] mix, it [the mixture] includes one moist drug and the remainder, dry drugs. The honey helps with the natural mixture of the moist and the dry [drugs]. The time from the beginning of this mixture until the end of the mixture, is **six** months. **Abrās composed an electuary from these seven?**[51] **drugs** …

Page 39 (view 45)

يسميه معجون السميد ويستعمله
كما يستعمل المعجونات للرياح الشديدة واوجاع القلب والحزن والحمى النافض ولتنقية المعدة ولوجع الطحال*
ثم بعد ذلك ايضاً يمتزج عشرة ادوية وهي
المطبوخ/ والخبز/ والعسل/ والسورنجان[52]
والسنبل/ واصول الكبر
والسنبل/ والمقل/ وحب الباسان/ ودقيق الكرسنة
وأول ما يبتدي من ذلك المطبوخ*
ثم تلوه بعد ذلك الادوية واحد بعد واحد*
ثم يمازجها في آخر الامر العسل*
هذه الممازجة تكون في ستة اشهر*
كان مريانيدوس يولف
من هذه العشرة الادوية معجوناً يسمنه معجون العشرة*
يسقيه من جميع اوجاع الجوف*
ثم بعد ذلك يمتزج عشرة ادوية أخر*
وهي*
المطبوخ/ والخبز/ والعسل/ واصول
ودقيق الكرسنة/ والقنطوريون
والأشق/ والسكبينج/ والزراوند/ وجند بيدستر

… **he called it the electuary of the semolina (*ma'ajūn al-samīd*) and he used it**, just like he used the electuaries [dealing with] excessive flatulence, pains of the heart, sadness, fevers and associated chills, purification of the stomach, and pain of the spleen.

Then, he [another physician] mixed ten additional drugs, and they are:
***maṭbūkh*/ bread/ honey/ autumn crocus**
spikenard/ capers
spikenard/ bdellium/ balsam berries/ vetch flour[53]
The first to start is the *maṭbūkh*. Then, the remainder of the drugs follow, one after the other. Then, finally, he mixed this with honey. This mixture takes six months. From these ten drugs, **Miryānīdūs composed an electuary**, which he named the electuary of the ten (*ma'ajūn al-*

[51] Perhaps a scribal error, as he mentions nine drugs above for this recipe.

[52] See note below for the reading of this table.

[53] The table is read according to the pattern created, distinguished by its colour. In this case, it is two sets of rhombii in black, and the two drugs in blue.

ʻashara). He gives a drink of this for all the pains of the lower part of the body (below the chest and the diaphragm).

Then, he mixed ten additional drugs, and they are:
***maṭbūkh*/ bread/ honey/ capers**
vetch flour/ centaury
gum ammoniac/ sagapenum/ birthwort/ castoreum

Page 40 (view 46)

وأول ما يبتدئ بالممازجة من هذه هو المطبوخ*
ثم تلوه بعد ذلك ساير الادوية *
ثم بعد ذلك العسل*
هذه الممازجة تكون في ستة اشهر*
وكان ميرويس يولف من هذه الادوية
دواء يسميه معجون السكبينج*
وهو مسهل يسقيه لعلل الراس العتيقة*
ثم بعد ذلك يمتزج هذه العشرة الأدوية*
وهي*
المطبوخ/ ودقيق/ والعسل/ والقردمانا
والخبز/ والفو
والجاوشير/ والقاقيا/ والانسيون/ المر
وأول ما يبتدئ من ذلك بالممازجة المطبوخ*
ثم بعد ذلك يذعن ساير الادوية *
ثم بعد ذلك العسل*
وهذه الممازجة تكون في ستة اشهر*
هذه العشرة يولف منها
ديمقراطس معجوناً يلقبه

(continued from the above recipe)
The first to start is the *maṭbūkh*. Then the remainder of the drugs follow. After that, the honey [is mixed in]. This mixture takes six months. **From these drugs, Mayrūyīs composed** a medicine, which he named the electuary of the sagapenum (*maʻajūn al-sakabinj*). He gives a drink of it for ease of lingering[54] headache.

Then, he mixed ten additional drugs, and they are:
***maṭbūkh*/ vetch flour/ honey/ cardamom**
bread/ valerian
opoponax/ acacia/ anise/ myrrh
The first to start is the *maṭbūkh*. Then, the remainder of the drugs obey/interact. After that, the honey. This mixture takes six months. **From these ten [drugs], Dīmaqrātis composed an electuary and he named it** …

[54] العتيقة which literally means old, is translated as lingering (that is, one that first began some time ago).

Page 41 (view 47)
(only the first two recipes on this page have been transcribed and translated)

معجون الجاوشير*
يسقيه من الخنازير*
ويكون منفعة ذلك فيه*
ثم بعد ذلك يمتزج من جملة الأدوية*
أحد عشر دواء*
وهي*
وهي/ المطبوخ/ العسل/ وقفر اليهود
وورق الساذج/ والخبز/ والدقيق/ والفو
والزعفران/ والصمغ/ وحب البلسان/ والمصطكى
وأول ما يبتدئ بالممازجة من ذلك المطبوخ*
ثم بعد ذلك يمتزج ساير الادوية *
وبعدها كلها العسل*
وهذه الممازجة تكون في ستة اشهر*
كان بقراطس الطبيب
يولف منها معجوناً يسميه معجون الزعفران*
يستعمله لعلل الطحال خاصةً ويكون منفعته لهذا العضو*

…the electuary of opoponax (*ma'ajūn al-jāwashīr*). He gives a drink of it for scrufolosis, and there is benefit in this [electuary].

Then, he mixed from all the drugs [mentioned], eleven drugs, and they are:
and they are/ *maṭbūkh* / honey/ asphaltum[55]
Malabar cinnamon/ bread/ vetch flour/ valerian
saffron/ gum/ balsam berries/ mastic
The first to start is the *maṭbūkh*. Then he mixed the remainder of the drugs. After that, the honey. This mixture takes six months. Buqrāṭis, the physician, composed from this an electuary, which he called the electuary of the saffron (*ma'ajūn al-za'fran*). He used it especially for the disease of the spleen, and it is beneficial for the organs.

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يمتزج بعد ذلك ويؤلف من هذه الادوية*
ستة ادوية اخر وهي*
المطبوخ/ العسل
والدقيق/ وفقاح الاذخر
الخبز/ والسليخة
[وأول ما يبتدئ من ذلك] بالممازجة المطبوخ*
ثم بعد ذلك ساير الأدوية*
وبعدها كلها العسل*
وهذه الممازجة تكون في ستة اشهر*
هذه الادوية الستة يولف منها جالينوس ضماداً يضمد الصلابة التي في الطحال*

[55] In order to maintain a pattern of three rhombii for a total of eleven drugs, the scribe added in a filler word in the first box.

فذلك جميع السنين التي تمزج فيها هذه الأدوية على ما بيناه عشر سنين وستة أشهر*
والناس في استعمل هذا الدرياق مختلفون*
فمنهم من يستعمله اذا استحكمت ممازجة وهذا اذا أتت عليه عشر سنين وستة اشهر وهذا أجود ما يكون من الأوقات وبلغها منفعة*
ومنهم من يستعمله اذا ابتدأت الممازجة بلحوم الأفاعي في ساير الأدوية وهذا الوقت دون الوقت الأول واقل منه منفعة*
ومنهم من يستعمله وقت ابتدأت الممازجة بعد ستة اشهر*
وهذا اقلها كلها واقربها وقتاً واقلها منفعة*
وقد بان لك الآن فضل المطبوخ والعسل في هذا المعجون*
ذلك انهما يمازجان ساير الأدوية ويولفان بينها ويحفظانه من الانقطاع ويجمعان تشتيت الأدوية ويطيبان طعمه ويزيدانه منفعة بما فيهما من المنافع ويمسكانه على طول الزمان*
واما ما ذكر اندروماخس من مقادير الشربات وبماذا يشرب في العلل*
فلقد أحسن في ذلك وجالينوس يصححها له ويقول ان مقادير الشربات من هذا الدرياق لكل واحد من العلل من اوفق يكون واجوده امتزاجاً وحسم دآء وشفاء مرض فليس يجب ان يغير ما جده الرجل من المقادير وما يشرب بها الشربات*

تم الكتاب ولله الحمد والمنة
وصلواته على خاتم انبيائه محمد وعترته الطاهرين اجمعين*

كتبه أضعف عباد الله سبحانه
محمد ابن السعيد شريف الحاج والحرمين أبي الفتح عبد الواحد ابن الامام الرشيد ابي الحسن ابن الامام المفيد ابي العباس احمد في ربيع الأول سنة خمس وتسعين وخمس مائية*

Then he mixed and composed from the drugs [mentioned], six additional drugs, and they are:
***maṭbūkh*/ honey**
vetch flour/ citronella
bread/ Chinese cinnamon
The first to start the mixture is the *maṭbūkh*. Then he mixed the remainder of the drugs. After that, the honey. This mixture takes six months. **From these six drugs**, Jālīnūs (Galen) **composed** a poultice to heal the stiffness of the spleen.

The sum of years it takes for these drugs to be mixed, as we explained, is ten years and six months. People use this theriac in different ways. Some use it once the mixture is perfect/complete and this would be at ten years and six months. This is the optimal time and is the most beneficial. Some use it once the viper flesh starts to mix with the rest of the drugs. This is less optimal than the previous and has less benefits. Some use it at the beginning [stages] of the mixing [process], at six months. This is the least [optimal], the shortest in time, and the least beneficial. We have explained to you the merits of the *maṭbūkh* and honey in this electuary. They both mix with the rest of the drugs, they combine with them, protect them from separating, gather the drugs that have separated, improve its taste, augment the benefits [of the electuary] with their advantages, and hold [its shape] at all times. Whatever Andromachus mentioned about the quantity of the [medicinal] drinks and what one [must] drink for the diseases, he did so very well. Galen confirmed this and said that the quantity of the drinks for this theriac, for each of the diseases, is the most successful. It is the most excellent combination and an unrivalled remedy for the diseases. One must not change the quantities of the drinks that the man [Andromachus/Galen] has defined.

The book has ended. For Allah, the praiseworthy and the generous.
Prayers for the seal of prophets, Muhammad, and his progeny, the pure.

The weakest of the slaves of Allah, praise be upon him, Muhammad, son of the blessed and honoured by the visitation of the Hajj and the sacred mosques, Abu'l-Fath 'Abd'l-Wahid, son of the wise leader, Abu'l-Hassan, son of the knowledgeable leader, Abu'l-'Abbas Ahmed wrote this book, in Rabi al-Awwal, in the year five hundred and ninety-five.

Tables

Table 1: **Schematic drawings.** *Kitāb al-diryāq*, dated Rabi‘i 595 AH/December 1198–January 1199 AD. Paris, Bibliothèque Nationale, arabe 2964. Drawings by author.

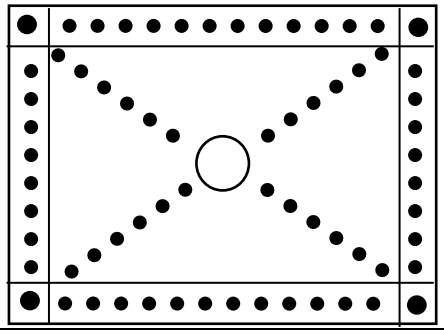
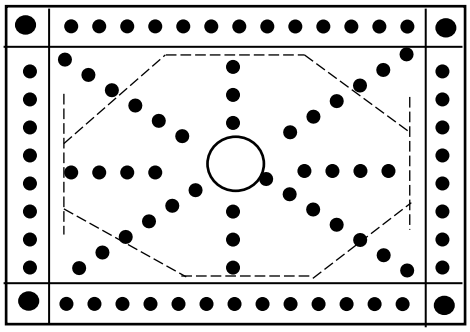
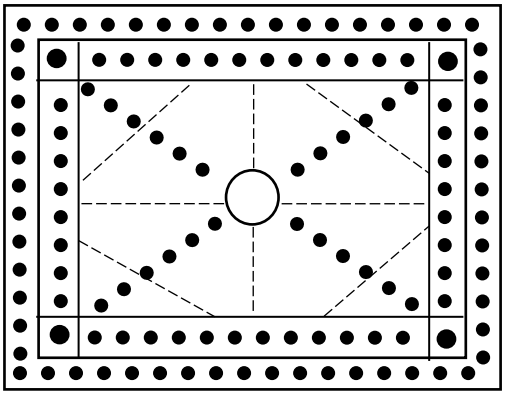
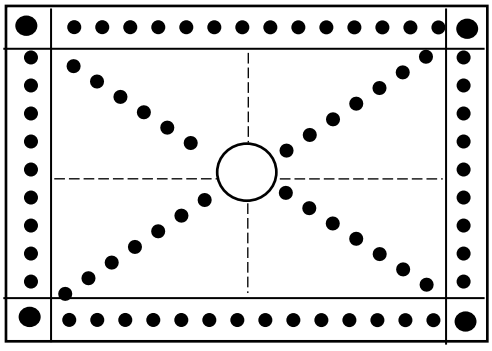
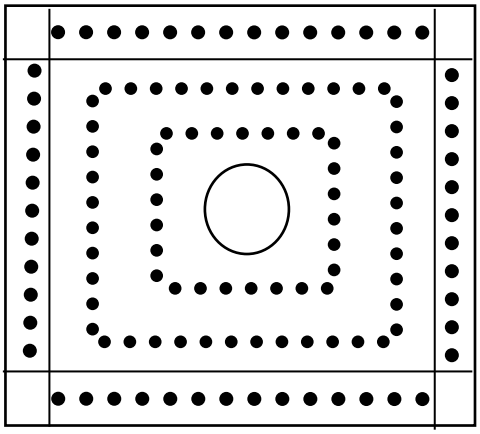
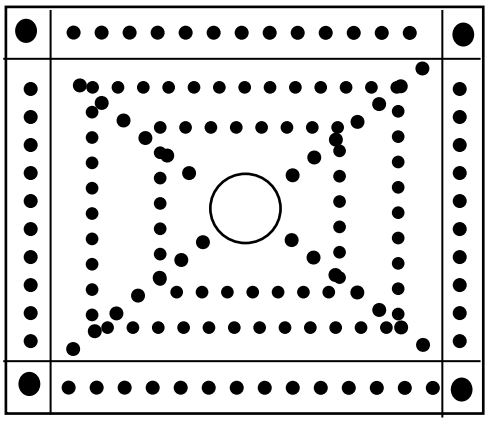
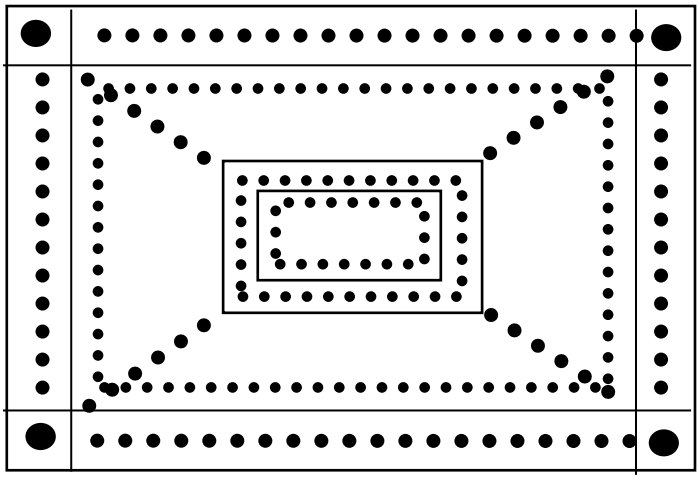
Diagram 1	
Diagram 2	
Diagram 3	
Diagram 4	

Diagram 5	
Diagram 6	
Diagram 8	

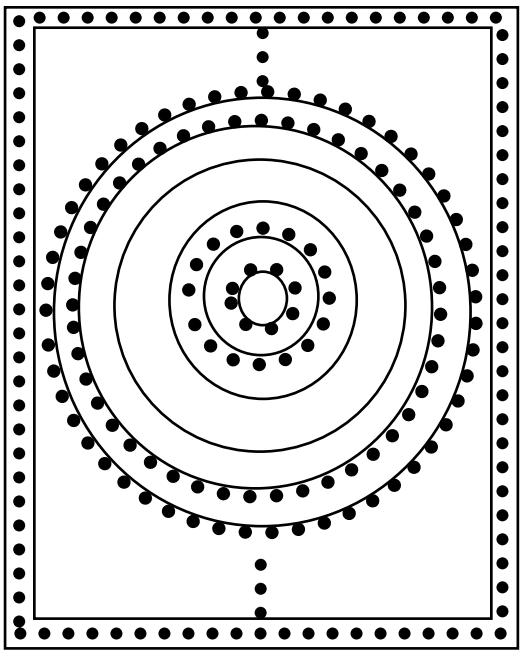
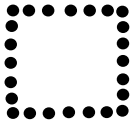
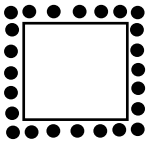
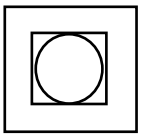
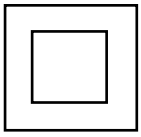
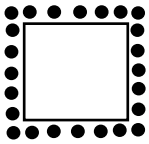
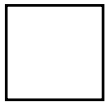
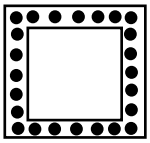
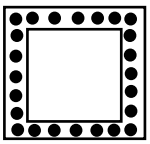
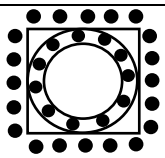
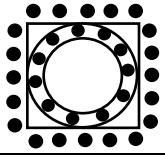
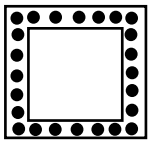
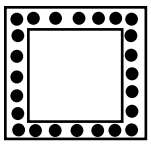
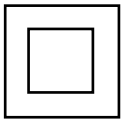
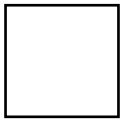
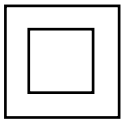
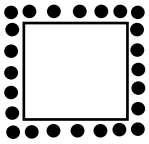
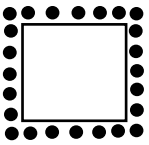
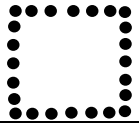
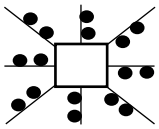
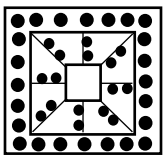
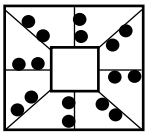
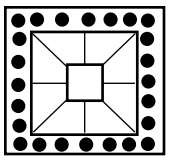
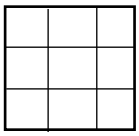
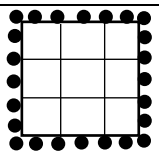
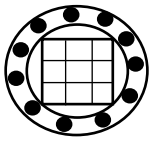
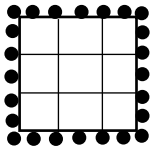
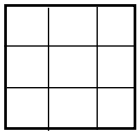
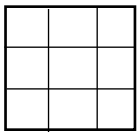
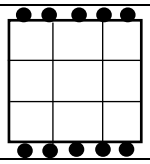
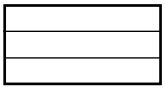
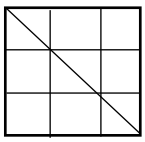
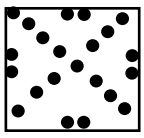
Diagrams 7 and 9	

Table 2: Quadrilaterals and Polygons

The drawings below provide a schematic representation of the object design and are not perfect replicas. The dark circles represent script/pseudo-script. Unless mentioned, the text is in Arabic.

No. & Category	Period	Object name	Design (drawing)	Object details	Collection/Source
1. frame	eastern Med, c. 3rd C	magical gem, Greek		rectangular text is a love charm: "Bring Achillas son of Serapias to Dionysias, daughter of Serapias."	Bonner, *Studies in Magical Amulets*, fig. 156
2. frame	Egypt, 3rd C	magical papyri, Greek		incantation text surrounding a word-shape.	Dornseiff, *Das Alphabet in Mystik und Magie*, 58
3. frame	Byzantine, 6th C	Coptic textile		vegetal ornamentation, geometric motifs, and interlacing within the frames.	Cleveland Museum of Art, 1919.21
4. frame	Byzantine, 6th C	Coptic textile		Ge (Earth personified) in central field and repeated along the border.	Cleveland Museum of Art, 1973.21
5. frame	Egypt, c. 9–15th C	magical amulet, paper (verso), Hebrew and Aramaic		magic name in boxes around central field; recto includes a text for protection against abortion.	Cambridge University Library T-S K1.18
6. frame	Egypt, c. 9–15th C	magical text, paper (recto and verso), Judaeo-Arabic		rectangular boxes enclose names of God/supernatural beings.	Cambridge University Library T-S K1.91
7. frame	Egypt, c. 10–11th C	amulet, paper		encircling Greek script; Arabic script in central field.	Österreichische Nationalbibliothek, A.Ch 12.145
8. frame	Egypt, c. 10–11th C	amulet, paper		encircling script in Kufic: "might and power belong to Allah." Cursive script in central field indecipherable.	Österreichische Nationalbibliothek, A.Ch 12.140
9. frame	Egypt or Spain, c. 9–14th C	amulet, paper		rectangular text praises Allah; circular text is in linear Kufic style and illegible.	LACMA M.2002.1.370
10. frame	Egypt or Spain, c. 9–14th C	amulet, bronze		the design sits within an arch-shaped pendant.	LACMA M.2002.1.609a-b

11. frame	Afghanistan, 10th–11th C	amulet case, pendant		rectangular text invoking blessings on Hassan b. Ahmad; vegetal pattern in central field.	The David Collection 8/1987
12. frame	Khorasan, Iran, 12th C	amulet		rectangular text offers general blessings; vegetal pattern in central field.	Linden Museum, Stuttgart A36067L
13. frame	7–13th C	amulet, lapis lazuli		central field with Q112 in Kufic script.	Khalili Collection, TLS 53.
14. frame	Egypt, c. 12th C	seal-ring, silver		rectangular bezel with linear Kufic script in reverse: "O Prophet of God be my intercessor unto God."	Wenzel, *Ornament and Amulet*, cat. 166
15. frame	9–12th C	ring, gold and lapiz lazuli intaglio		script in central field reads: "God sufficeth me"	Benjamin Zucker Collection, cat. 10
16. frame	Egypt or N. Africa, 9–12th C	ring, silver		text around and inside contain legible and illegible text. Text in central field appears to be recipe for healing.	Wenzel, *Ornament and Amulet*, cat. 86
17. frame	9–12th C	bezel, haematite, likely talisman		encircling text in linear Kufic.	Benjamin Zucker Collection, cat. 101
18. frame	Iran, 8–10th C	administrative seal, lead		framing text reads: "ordered [by] Allah in fairness and justice."	British Museum 1983,0917.3
19. grid	c. 1000	horoscope, Greek		horoscope casted on October 28, 497.	Florence, Cod. Laur. Plut. 28, 34.
20. grid	Geniza archive, 11–12th C	nativity horoscope, Hebrew		double encircling frames with Hebrew text.	Leningrad Institute Narodov Azii D 55, f. 9
21. grid	Geniza archive, 11–12th C	birthday horoscope		central square identifies the client, and the casting date off 1146.	British Library Or. 5565, ff. 47r–48r

22. grid	eastern Iran, 11–12th C	nativity horoscope		astronomical personifications around the inner border of the encircling frame.	Al-Sabah Collection, Kuwait LNS 275 MSa–b
23. grid	Syria, c. 1200	magic square, on a magic-medicinal bowl		3x3 square amidst various magical iconography.	The David Collection 36/1995
24. grid	10–15th C	seal, rock-crystal		4x4 square; encircling text with names of God.	British Museum 1903,1116.9
25. grid	c. 15th C	amulet, papyrus		4x4 square with Q2:137: "God will suffice you for them …"	Bienecke Library, Yale University P.CtYBR inv. 2016
26. grid	Iran, 12th C	magic mirror, bronze		4x4 square with text inscribed in diagonal plane	Linden Museum, Stuttgart 5350
27. grid	1201–1300	*Shams al-ma'ārif*, al-Buni		5x5 square with *abjad* numerals; labelled *khātim*. Seven squares on page for each day of the week.	BnF arabe 2647
28. grid	1575–1600	*Shams al-ma'ārif*, al-Buni		10x10 square with verses from Q57.	BnF Supplément turc 244
29. grid	Iran, 19th C	talismanic chart, labelled *shakl*		5x5 square includes the *shahāda*, name of the Prophet, and a series of numerals. Instructions for *looking* at figure.	Maddison et. al, *Science, Tools and Magic*, 58.
30. magical diagram	Geniza, 9–12th C	diagram of the letter *lām*		the letter is repeated ten times on each row for a total of thirty counts.	Ebied and Young, *A Fragment of a Magic Alphabet from the Cairo Genizah*, 406.
31. magical diagram	Geniza, 9–12th C	diagram of the letter *kāf*		the letter is repeated sporadically within the diagram for a total of eighteen counts.	Ebied and Young, *A Fragment*, 405.
32. magical diagram	1501–1600	*Shams al-ma'ārif*, al-Buni		the script is a series of disjointed letters. Image described as *khātim* in preceding text.	BnF arabe 2646

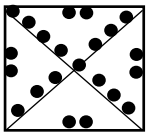
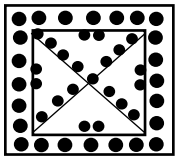
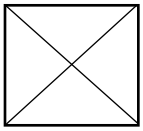
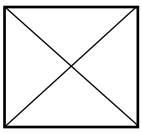
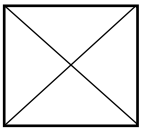
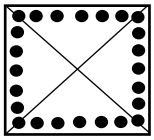
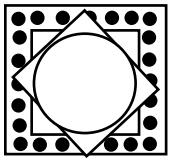
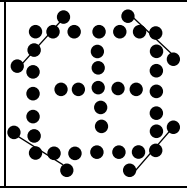
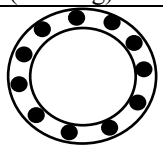
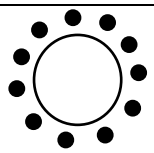
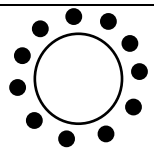
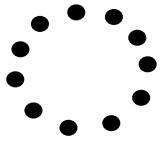
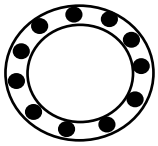
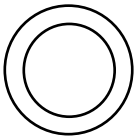
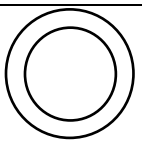
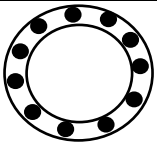
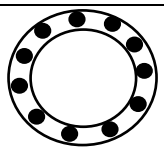
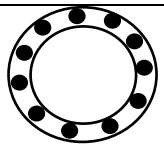
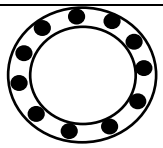
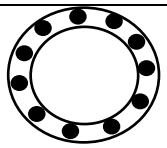
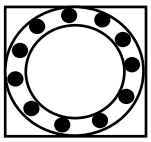
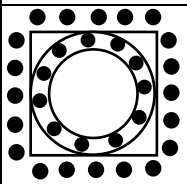
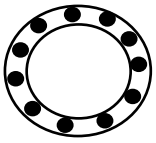
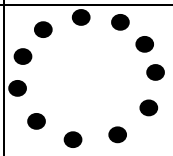
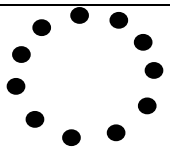
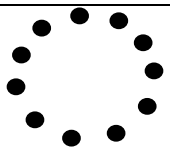
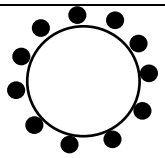
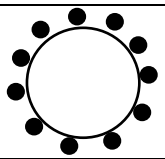
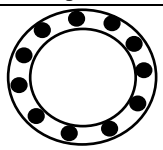
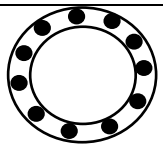
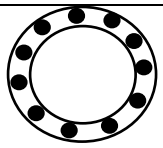
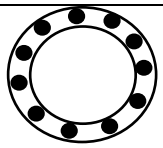
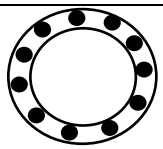
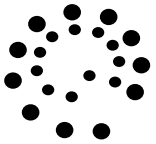
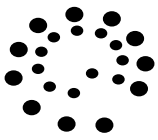
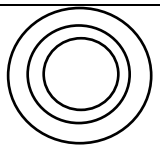
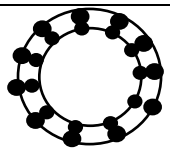
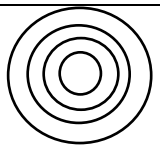
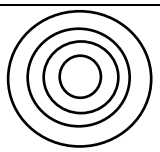
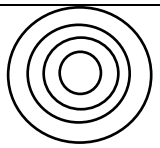
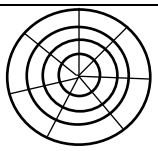
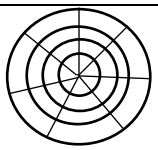
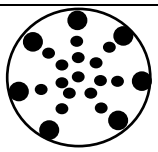
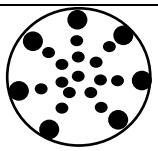
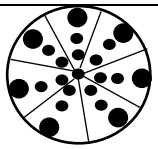
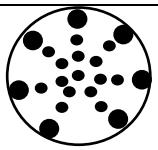
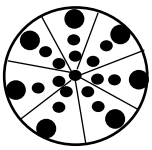
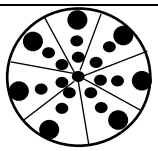
33. magical diagram	1575–1600	*Shams al-ma'ārif*, al-Buni		the script is a series of disjointed letters.	BnF Supplément turc 244
34. magical diagram	1601–1700	*Shams al-ma'ārif*, al-Buni		the four vertices are marked. Diagonal text converges into a small medallion placed at the center of the image. Described as a *tilsam*.	Bnf arabe 2650
35. magical diagram	Geniza archive, 9–12th C	magical diagram of the letter *nūn*		the letter is inscribed several times in each quadrant for a total of forty-eight counts.	Ebied and Young, *A Fragment*, 407.
36. magical diagram	Geniza archive, 9–12th C	magical diagram letter *fā'*		the letter is inscribed several times in each quadrant for a total of eighty-one counts.	Ebied and Young, *A Fragment*, 408.
37. magical diagram	India?	reverse of seal		isolated letters in each quadrant.	British Museum 1887,0115.1
38. magical diagram	1653	*Dā'irat al-aḥruf al-abjadiyya* (Hermetic treatise)		outer edges mark the four elements; inner edges are inscribed with isolated letterforms.	BnF arabe 2357
39. magical diagram	1201–1300	*Shams al-ma'ārif*, al-Buni		encircling text mentions the four elements, their properties, and names of God; labelled *khātim*.	BnF arabe 2647
40. magical diagram	16th C	*Jumla khawāṣṣ mufīda* (treatise on medicine)		the four vertices mark the names of four angels; labelled *khātim*.	Wellcome Library WMS Arabic 465

Table 3: **Circles**
The drawings below provide a schematic representation of the object design and are not perfect replicas. The black circles represent script/pseudo-script. Unless mentioned, the text is in Arabic.

No.& Category	Period	Object name	Design (drawing)	Object details	Collection/Source
1. enclosure	Egypt, 4th C	magical papyri, Greek		encircling text carries names of spiritual entity/ demon.	British Library, Papyrus 46, f. 5v
2. enclosure	Egypt, 3rd C	magical papyri, Greek		the *ouroboros* forms the circular frame.	British Library, Papyrus 121, f. 2r
3. enclosure	eastern Med, c. 3rd C	magical gem, Greek		the *ouroboros* forms the circular frame.	British Museum, OA.9911
4. enclosure	eastern Med, c. 3rd C	magical gem, Greek		circular frame is absent.	BnF, Cabinet des Médailles, 10757
5. enclosure	Nippur, 6–8th C	incantation bowl		two bound demons in central field.	Penn Museum, B945
6. enclosure	Egypt, 6–8th C	Coptic textile		knots and interlace in central field.	MMA 89.18.151
7. enclosure	Egypt, 6–8th C	Coptic textile		narrative of St. Joseph as figural illustrations.	MMA 63.178.2
8. enclosure	Roman, c. 225	aureus attached to a necklace		portrait of emperor in central field.	MMA 36.9.1
9. enclosure	Byzantine, 5–8th C	medallion, gold		dark circles depict coins and crosses in circular frames.	Virginia Museum of Fine Arts, 66.76

10. enclosure	Syria, 10–11th C	amulet of St. Symeon, lead		encircling text: "Eulogia of Saint Symeon Thaumatou-rgos [miracle worker]. Amen."	Skulpturensammlung und Museum für Byznatininsche Kunst, Berlin 32/73
11. enclosure	Syria, 6–7th C	pilgrim flask		encircling text: "Blessing of the lord of Saint Sergios." Rider-saint image in central field.	Walters Art Museum 55.105
12. enclosure	Syria, 5–7th C	amulet, cast bronze		encircling text: "Lord, help." Virgin and Child in central field.	Harvard Art Museum 1951.31.4.1868
13. enclosure	Byzantine, 10–11th C	amulet, silver		encircling script is illegible. Part of hystera or womb amulets.	Ashmolean AN 1980.53
14. enclosure	Egypt? c. 11th C	amulet, paper		encircling text praises God, with a central image of a six-pointed star.	MMA 1978.546.32
15. enclosure	Egypt? 10–15th C	amulet, paper		encircling text uses a linear Kufic script style.	LACMA M.2002.1.370
16. enclosure	Egypt? c. 11th C	amulet, paper		encircling text summoning God for refuge and protection.	MMA 1978.546.37
17. enclosure	8–10th C	administrative seal, lead		encircling text names the Abbasid caliph, al-Mu'tadid billah	British Museum 1983,0917.7
18. enclosure	8–14th C	seal, carnelian		encircling text with name of its owner, Ahmad b. Hafs	The Benjamin Zucker Collection no. 30
19. enclosure	8–14th C	seal, black jade		encircling text reads: "God is the trust of al-Fadl al-Haytham." Central field with a six-pointed star.	The Benjamin Zucker Collection no. 20

20. enclosure	8–14th C	seal, carnelian		encircling linear Kufic reads:"Sovereignty belongs to God, the only One, the One who subdues."	British Museum OA+.14309
21. enclosure	3rd C	seal of Mani, crystal		three busts in central field with encircling Syriac script	BnF, Cabinet des Médailles, inv. 58.1384bis
22. enclosure	Syria, 1169–70	magic-medicinal bowl		design on outer rim of bowl	Khalili Collection, MTW 1443
23. enclosure	Early Islamic	seal matrix		central image in linear Kufic script	Khalili Collection, MTW 320
24. enclosure	Byzantine, 11–12th C	divination bowl		design on inner rim	Treasury of San Marco, Venice
25. enclosure	548 AH/1153 AD	magic mirror		astrological personifications in central field	Baer, *Metalwork in Islamic art*, 249–50
26. enclosure	Jazira or Iran? 12–13th C	magic mirror		two harpies flanking a central knob	MMA 15.43.285
27. spiral	Egypt, 3rd C	magical papyri		ibis in central field	British Library, Papyrus 121, fol. 2r
28. spiral	Nippur, 6–8th C	incantation bowl		bound demons in central field	Penn Museum, B2945
29. concentric circles	printed ed., 1935.	cosmology diagram, Jabir ibn Hayyan		outer sphere is the first cause; inner sphere is the world of substance	Kraus, *Essai sur l'histoire*, 408.
30. concentric circles	printed ed., 1935.	cosmology diagram, Jabir ibn Hayyan		circle constructed using script	Kraus, *Essai sur l'histoire*, 443.

31. concentric circles	1546	celestial spheres, *Rasā'il Ikhwān al-ṣafā'*		twelve concentric circles	The Institute of Ismaili Studies
32. concentric circles		celestial spheres, Ibn ‘Arabi		fifteen concentric circles	reproduced in Burckhardt, *Mystical Astrology*, 13.
33. concentric circles	1401–1500	*Laṭā'if al-ishārāt*, Al-Buni		a series of Ptolemaic spheres, each representing two letters	BnF arabe 2658, f. 13v
34. concentric circles	1401–1500	*Laṭā'if al-ishārāt*, Al-Buni		text inscribed around concentric circles	BnF arabe 2658, f. 30r
35. concentric circles	1575–1600	*Shams al-ma'ārif*, Al-Buni		magic square in central field	BnF Supplément turc 244
36. spokes	Iraq or Iran, 6–8th C	incantation bowl		three unidentified figures in central field	British Museum 1886,0109.12
37. spokes	Milan? 398–407	pendant of Roman empress Maria (r. 398–407)		spokes read: “Honorius and Maria, may you live!” and forms a chi-rho	Paris, Musee du Louvre, OA. 9523
38. spokes	Islamic, c. 8–12th C	bone (diam: 5.5 cm)		spokes inscribe chapter 1 of the Qur’an. Reverse with Q 112.	Khalili Collection TLS 2611
39. spokes	1201–1300	basmala circle, *Shams al-ma'ārif*		each of the eight spokes repeat the basmala	BnF arabe 2647
40. spokes	1575–1600	basmala circle, *Shams al-ma'ārif*			BnF Supplément turc 244
41. spokes	Mosul, 13th C	geomantic device, one of nineteen circles		each circle is divided using sixteen spokes	British Museum 1888,0526.1

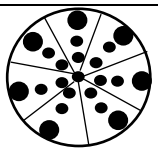
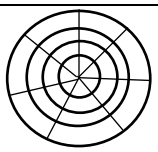
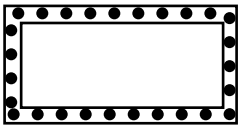
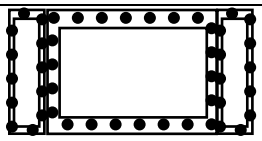
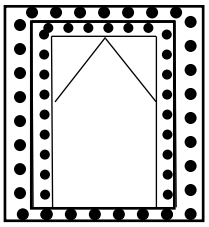
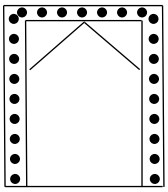
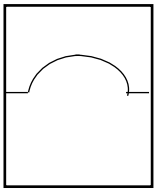
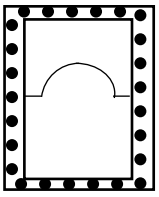
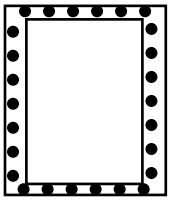
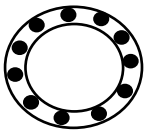
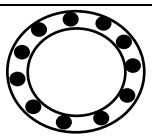
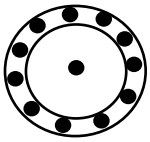
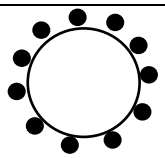
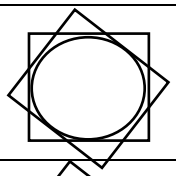
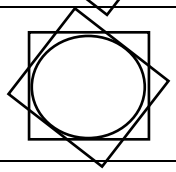
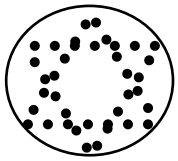
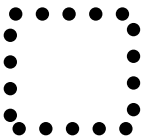
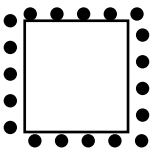
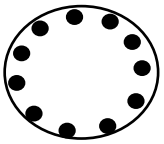
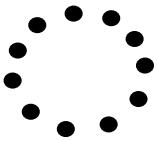
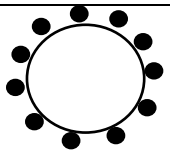
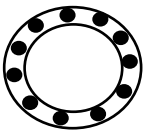
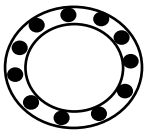
42. spokes	Jazira, 13th C	combination lock on a casket		one of four circles on top of the lid	Khalili Collection, MTW 850
43. spokes		*zā'irja*		circle is divided using twelve spokes	Ibn Khaldun's Muqadimma

Table 4: Architectural Objects and Coinage

The drawings below provide a schematic representation of the object design and are not perfect replicas. The dark circles represent script/pseudo-script. Unless mentioned, the text is in Arabic.

No. & Category	Period	Object name	Design (drawing)	Object details	Collection/Source
1. quadrilateral frame	Siraf, Iran, 383 AH/993 AD	grave cover, stone		Kufic script carrying blessings for Ibrahim b. ‘Ali.	Whitehouse, 1971
2. quadrilateral frame	Iran, 11–12th C	cenotaph, wood		frames carry the name of maker, verses of Qur’an, and a Prophetic saying.	ROM 974.68.1
3. quadrilateral frame	Iran, 495 AH/ 1101–2 AD	tombstone, marble		outer frame with name of craftsman and Q3:18; inner 3-sided frame with Q112.	LACMA M.71.73.34
4. quadrilateral frame	Iran, 13th C	tile panel		three-sided inscription with Q 112.	Harvard Art Museum 1955.89
5. quadrilateral frame	Jazira, 12th C	tile panel		central field within the arch includes Q112 and Q2:137.	MMA 30.96.184
6. quadrilateral frame	Mosul, c. 13th C	mihrab drawing		framing script carries Q112. Mihrab image includes Allah, Muhammad, and the rightly-guided caliphs.	MMA, Ernst Herzfeld papers
7. quadrilateral frame	Yazd, Iran, 1151	minbar fragment		frame with Q67: 3–5, inviting visual engagement.	MMA 34.150.1

8. circular frame	Madaba, Jordan 578–9	medallion, Church of the Apostles, Greek characters		central field with image of Thalassa, personification of sea. Encircling prayer: “Lord God, maker of heaven and earth, give life to Anastasios and Thomas and Theodora and Salamanios, mo[saicist].	Manar al-Athar
9. circular frame	Gerasa, Jordon, 6th C	medallion, Propylaea Church		encircling text carries Psalms: 85(86): 1¬3.	Crowfoot, 1931
10. circular frame	Mosul, 13th C	medallion, Mosque of Nur al-Din Zangi		central inscription of Allah. Encircling inscription with Muhammad (x6).	Yasser Tabbaa archive, Aga Khan Documentation Centre, MIT
11. circular frame	Safid Buland, Kyrgyztan, 1055–36	medallion, Mausoleum of Shah Fadl		one of sixteen medallions, referencing the most beautiful names of God.	Archnet
12. star	Madaba, Jordan, 767	mosaic pavement, Church of the Virgin		central field with a prayer inscription.	Manar al-Athar
13. star	Jericho, Palestinian territories, 8th C	Khirbat al-Mafjar		knotted vertices; geometric and interlacing motifs in central field.	Manar al-Athar
14. star	Cairo, 1133–53	central mihrab, *mashhad* of Sayyida Ruqayya		hexagram with Muhammad (x6); central field with name of ‘Ali.	Wikimedia Commons
15. coin	Mardin, 1165–71	coin of Najm al-Din Alpi, copper		central field with two diademed heads.	David Collection C72
16. coin	Mardin, 1174–84	coin of Qutb al-Din Il-Ghazi		central field with portrait of an antique bust.	Numista

17. coin	Mardin, 1202–3	coin of Nasir al-Din Artuq Arslan		central field with image of Sagittarius; circle along the stems of letters.	David Collection C191
18. coin	Mardin, 1209–10	coin of Nasir al-Din Artuq Arslan		central field with equestrian figure on a lion; encircling inscription in Linear Kufic.	David Collection C300
19. coin	1142–75	coin, Danishmendid		encircling script in Greek with name of ruling caliph; Arabic inscription in central field.	Whelan, 1980
20. coin	Hisn Kayfa, 1182	coin of Nur al-Din Muhammad bin Qara Arslan		central field with antique bust.	British Museum 1865,0805.73
21. coin	1220–37	lead seal of ‘Ala al-Din Kayqubad		central field with antique bust.	Antalya Museum Numismatic Collection B112

Figures

Unless noted, all images relating to Chapter 1 are from the *Kitāb al-diryāq*, dated Rabi‘i 595 AH/December 1198–January 1199 AD. Paris, Bibliothèque Nationale, arabe 2964. Source: gallica.bnf.fr. Note: The page numbers refer to the manuscript’s current pagination.



Fig. 1.1: Page 11 (detail)

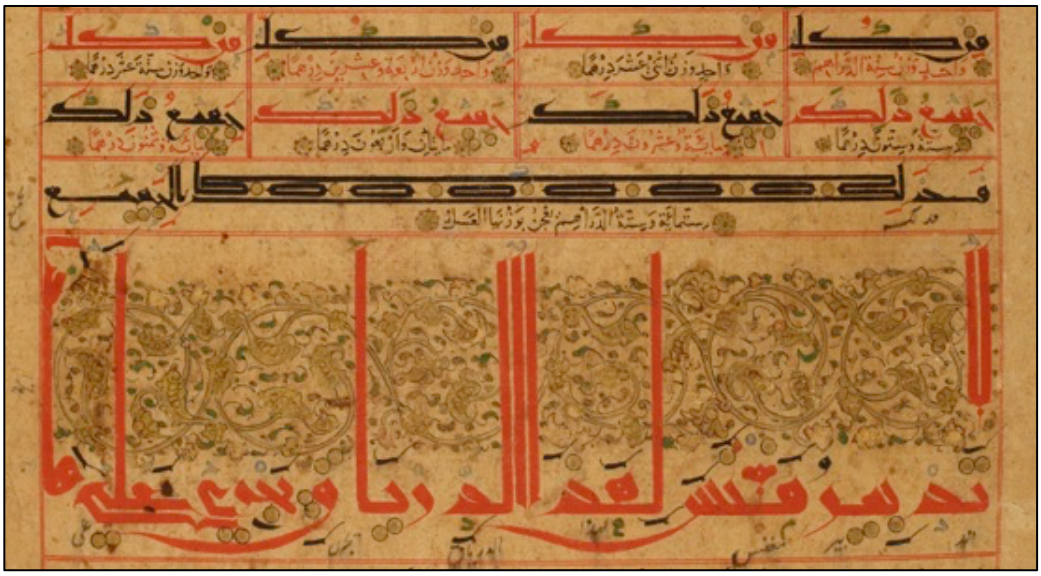


Fig. 1.2: Page 21 (detail)

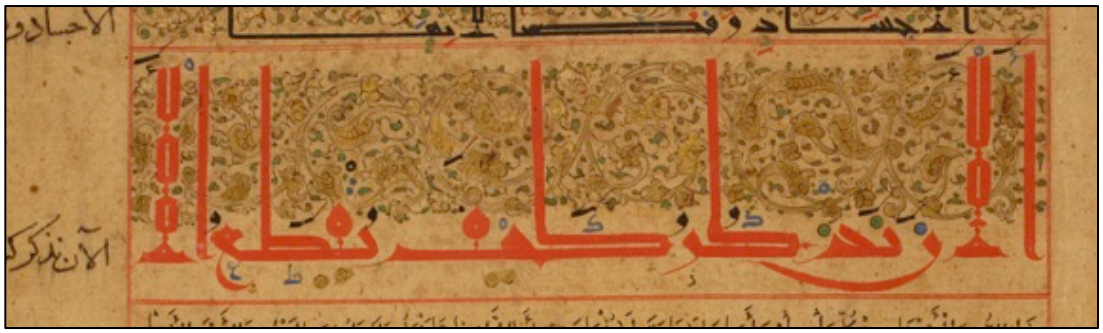


Fig. 1.3: Page 61 (detail)

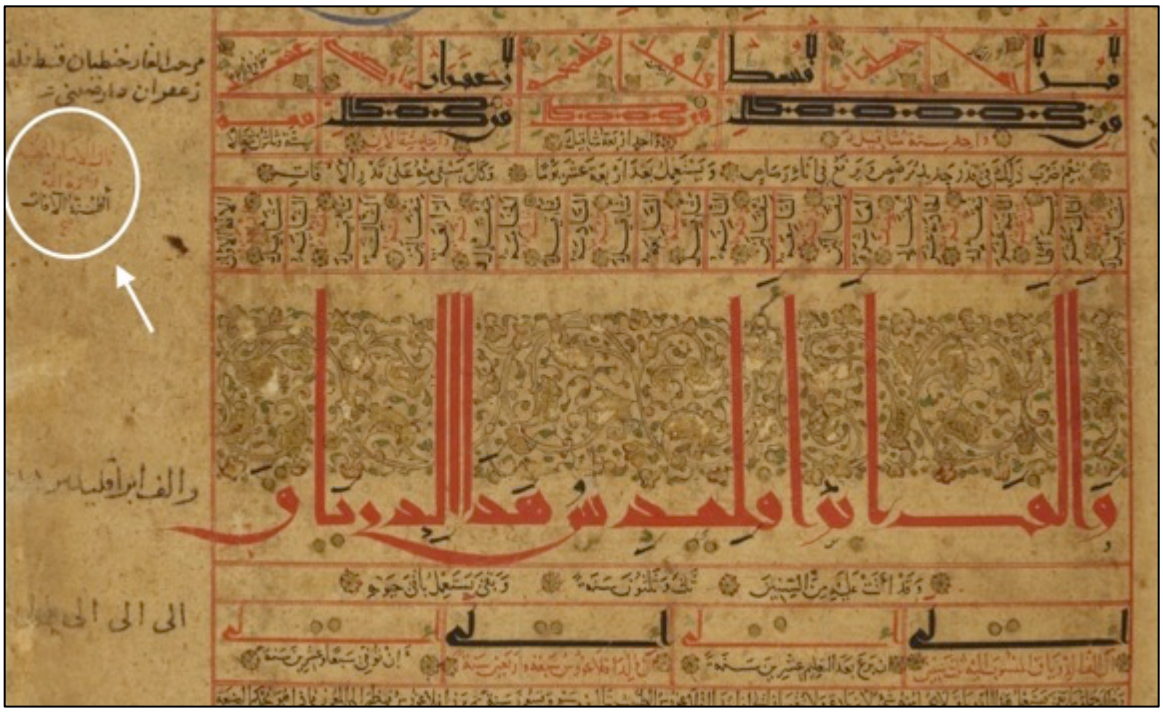


Fig. 1.4: Annotations attributed to Imam al-Mufid, page 13 (detail)



Fig. 1.5: Qur'an folio, 11th or 12th C, BL Or 6573, folio 9v



Fig. 1.6: *Munājāt* (*Confidential Talks*) of ‘Ali b Abu-Talib
MET 1995.324



Fig. 1.7: Chronological timeline of physicians, page 24 (detail)

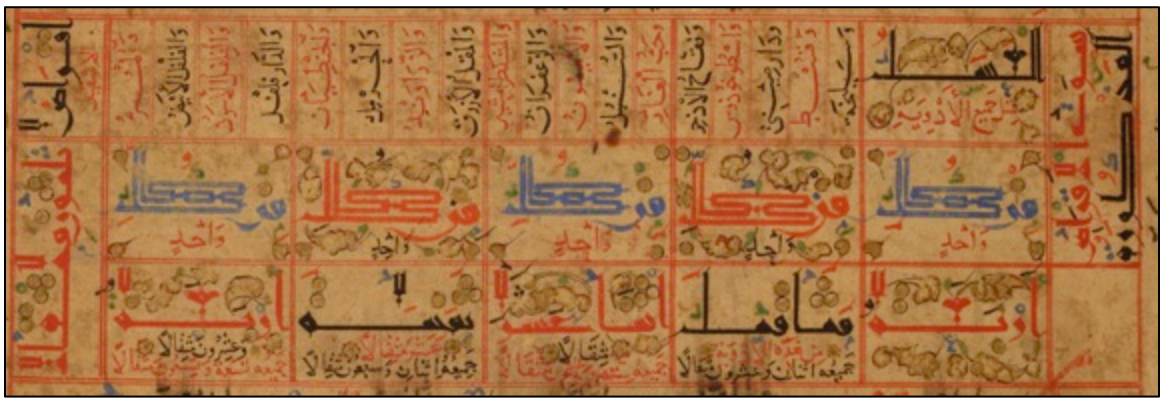


Fig. 1.8: Presentation of a recipe, page 11 (detail)



Fig. 1.9: Biographical timeline of a physician, page 16 (detail)



Fig. 1.10: Listing of drugs, page 9 (detail)



Fig. 1.11: Extra-theriacal recipes, page 39

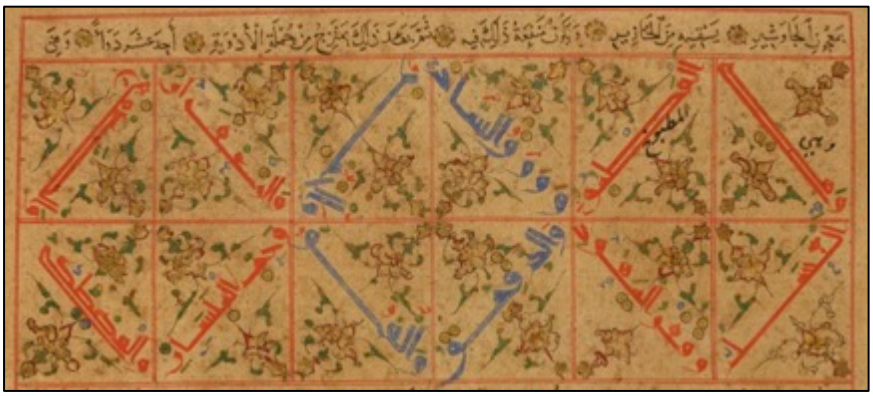


Fig. 1.12: Extra-theriacal recipe with 11 drugs, page 41 (detail)



Fig. 1.13: Recipe of Andromachus of Younger, page 70 (detail)



Fig. 1.14a: Diagram 1, page 20

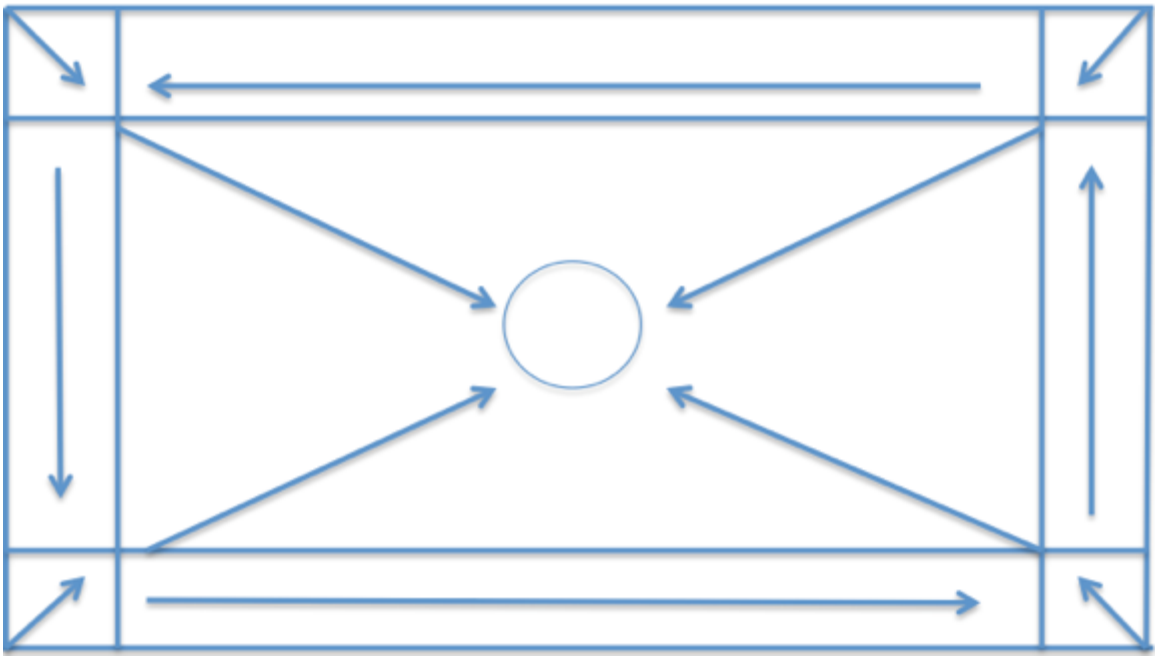


Fig. 1.14b: Diagram 1, arrows pointing in the direction of text

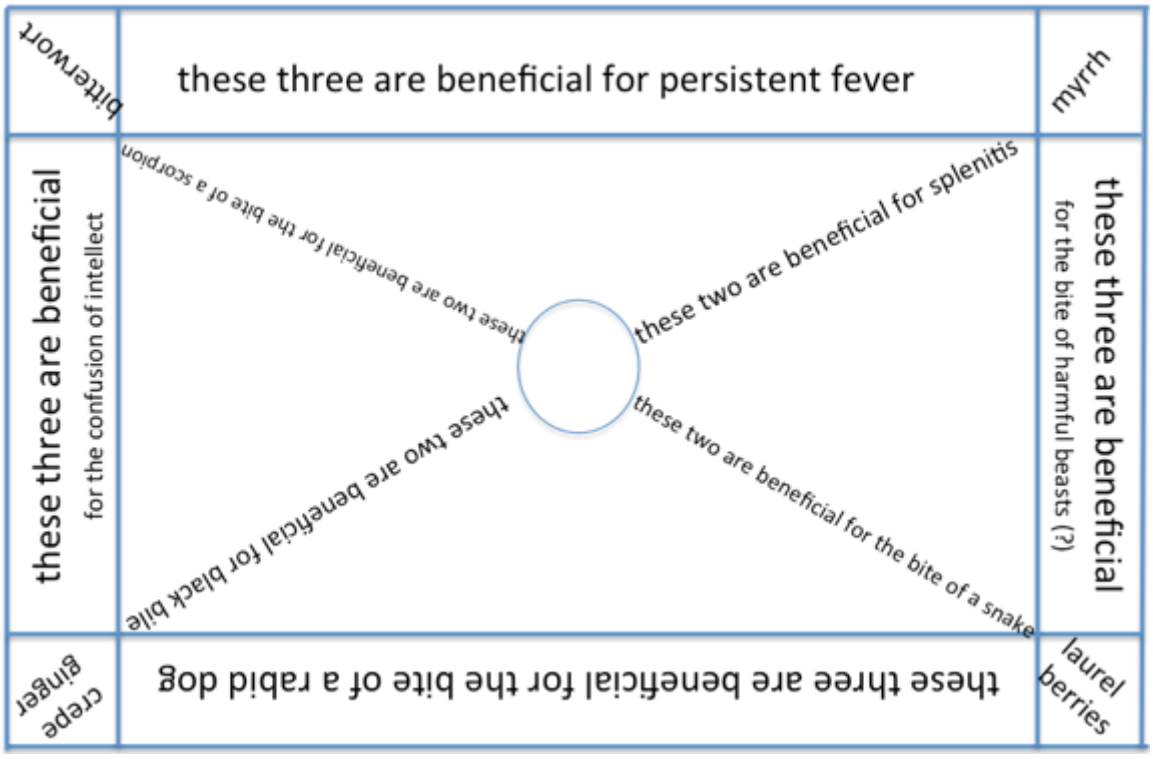


Fig. 1.14c: Diagram 1, translations

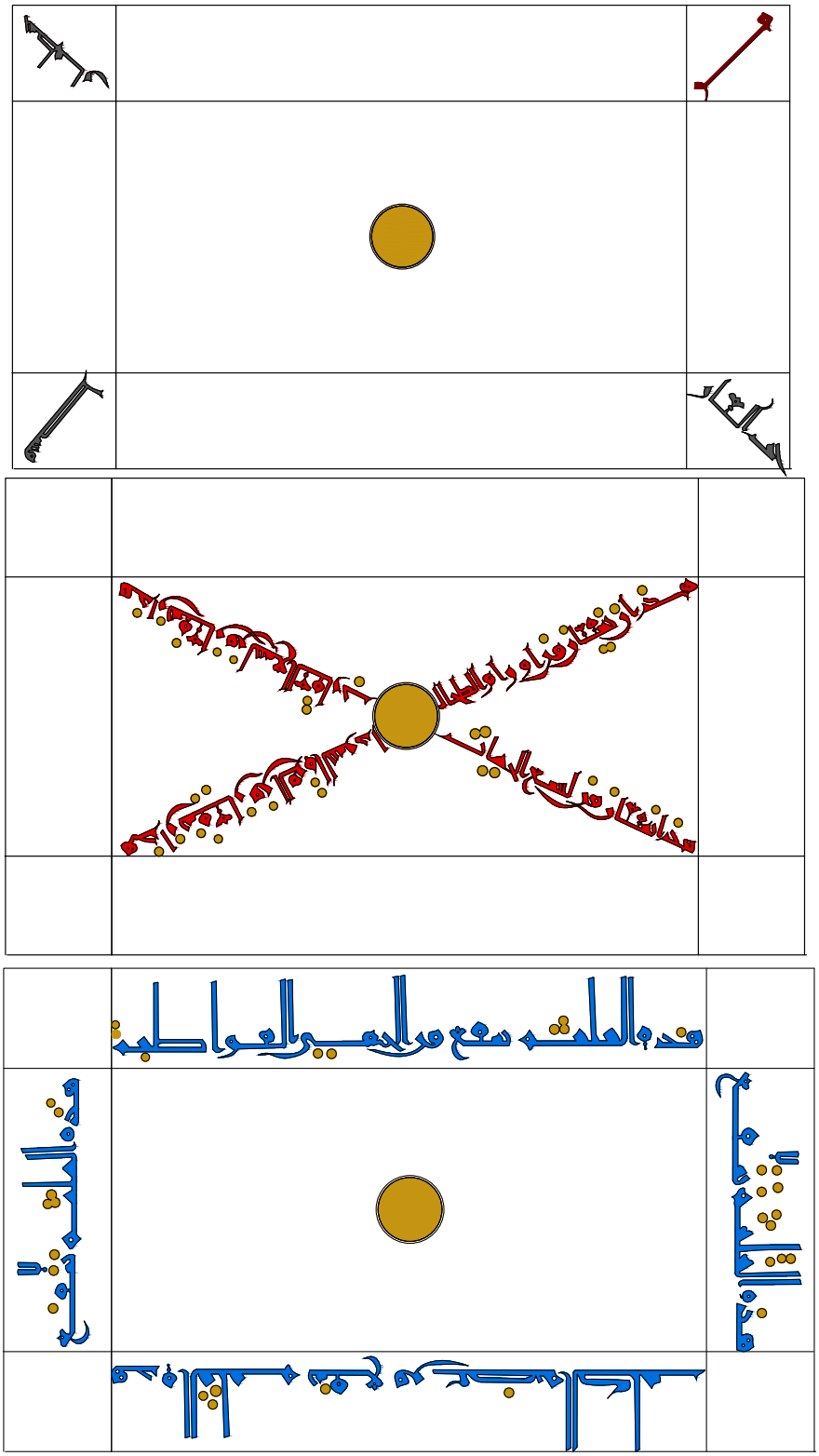


Fig. 1.14d: Diagram 1
(from top to bottom): Layers 1, 2 and 3. Drawings by author



Fig. 1.15a: Diagram 2, page 18

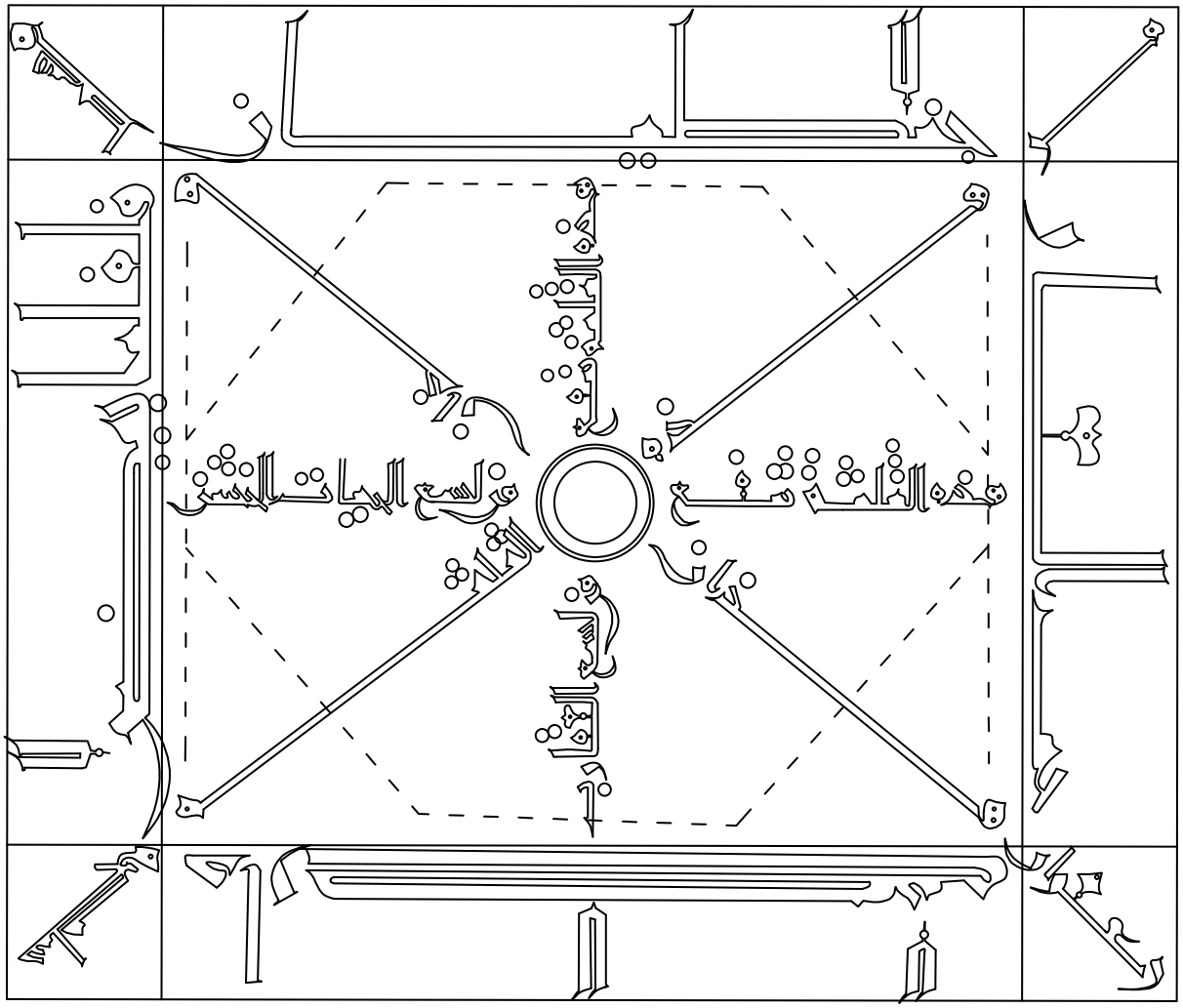


Fig. 1.15b: Diagram 2, drawing by author

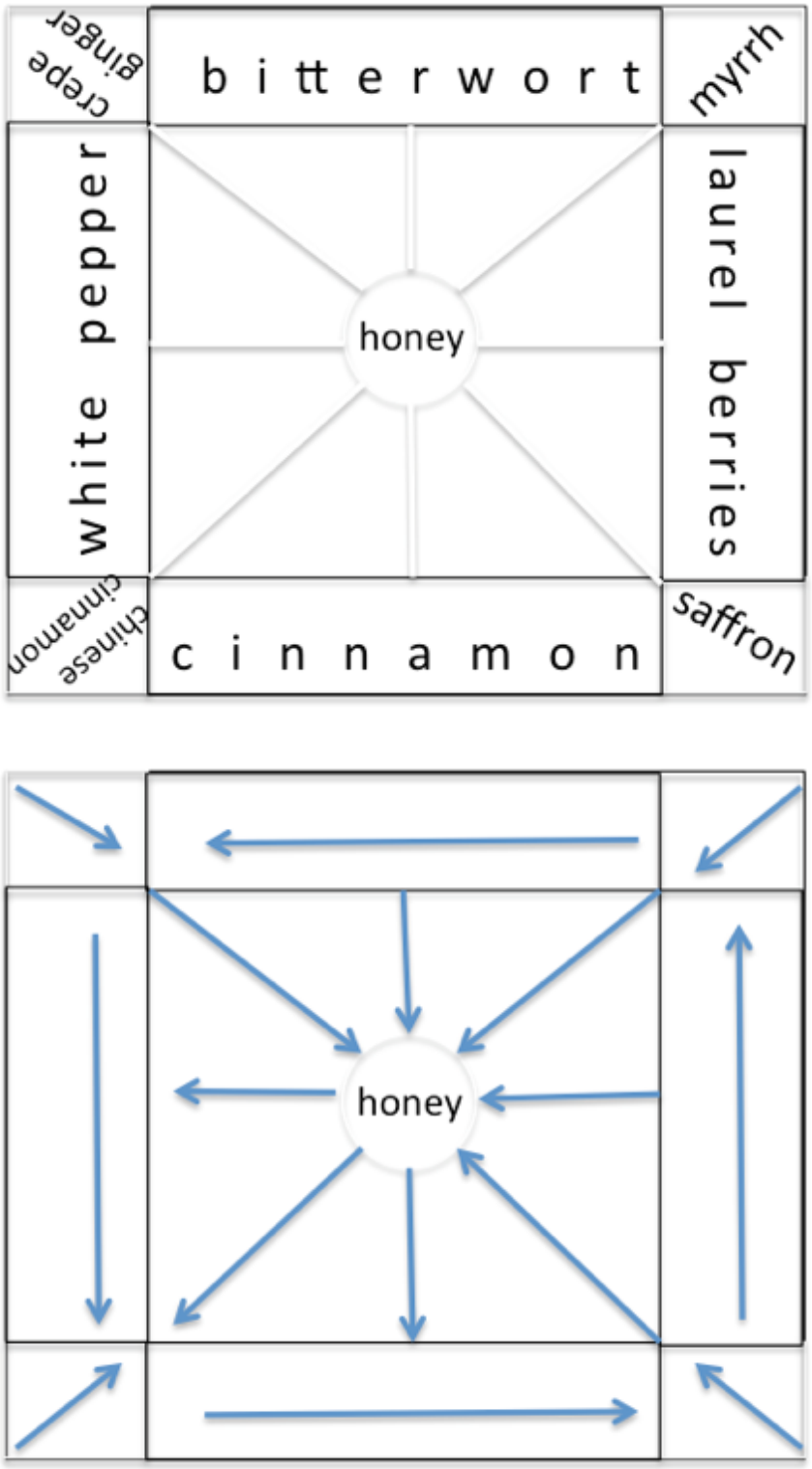


Fig. 1.15c: Diagram 2, translation and arrows pointing in the direction of text

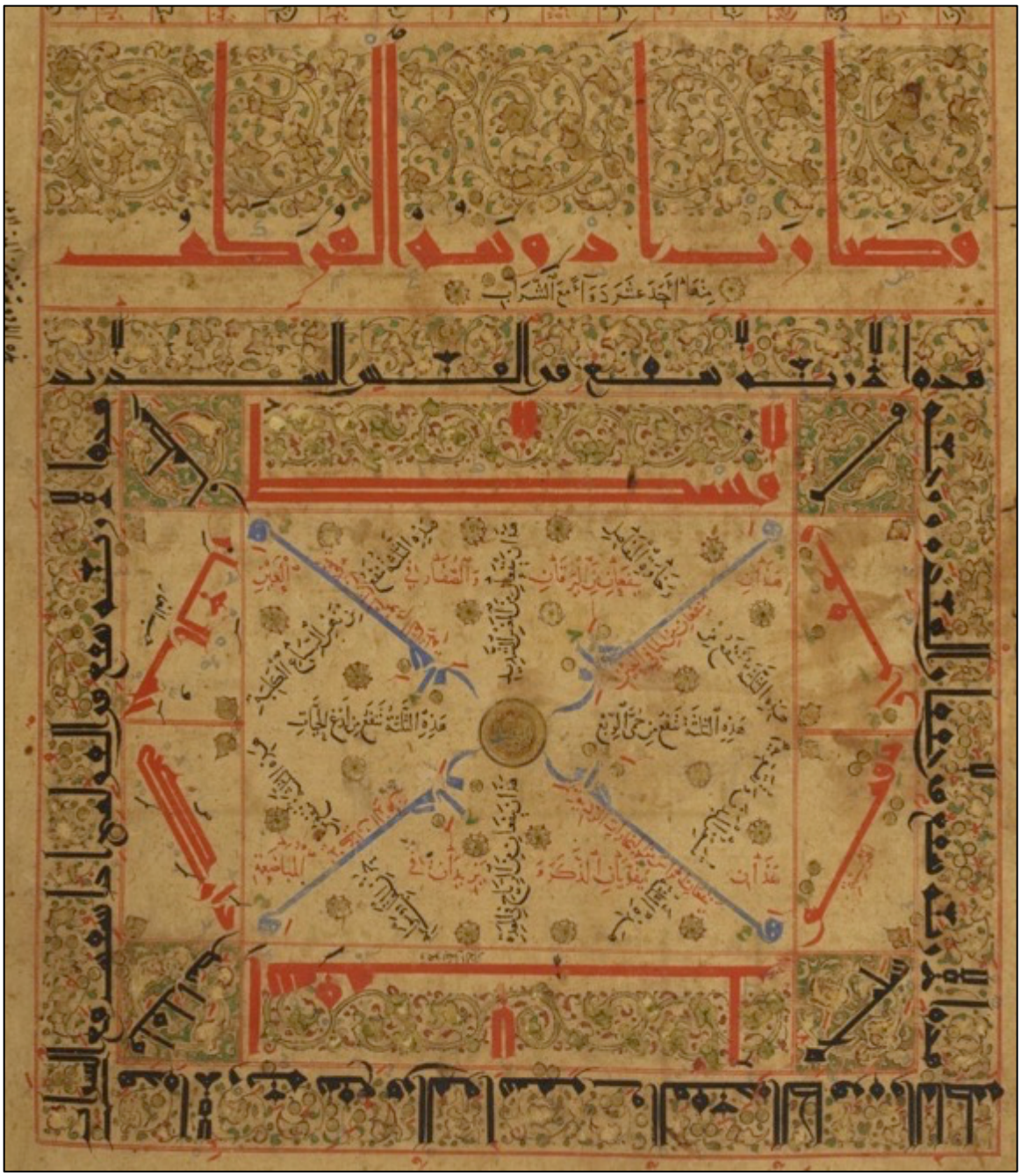


Fig. 1.16a: Diagram 3, page 14

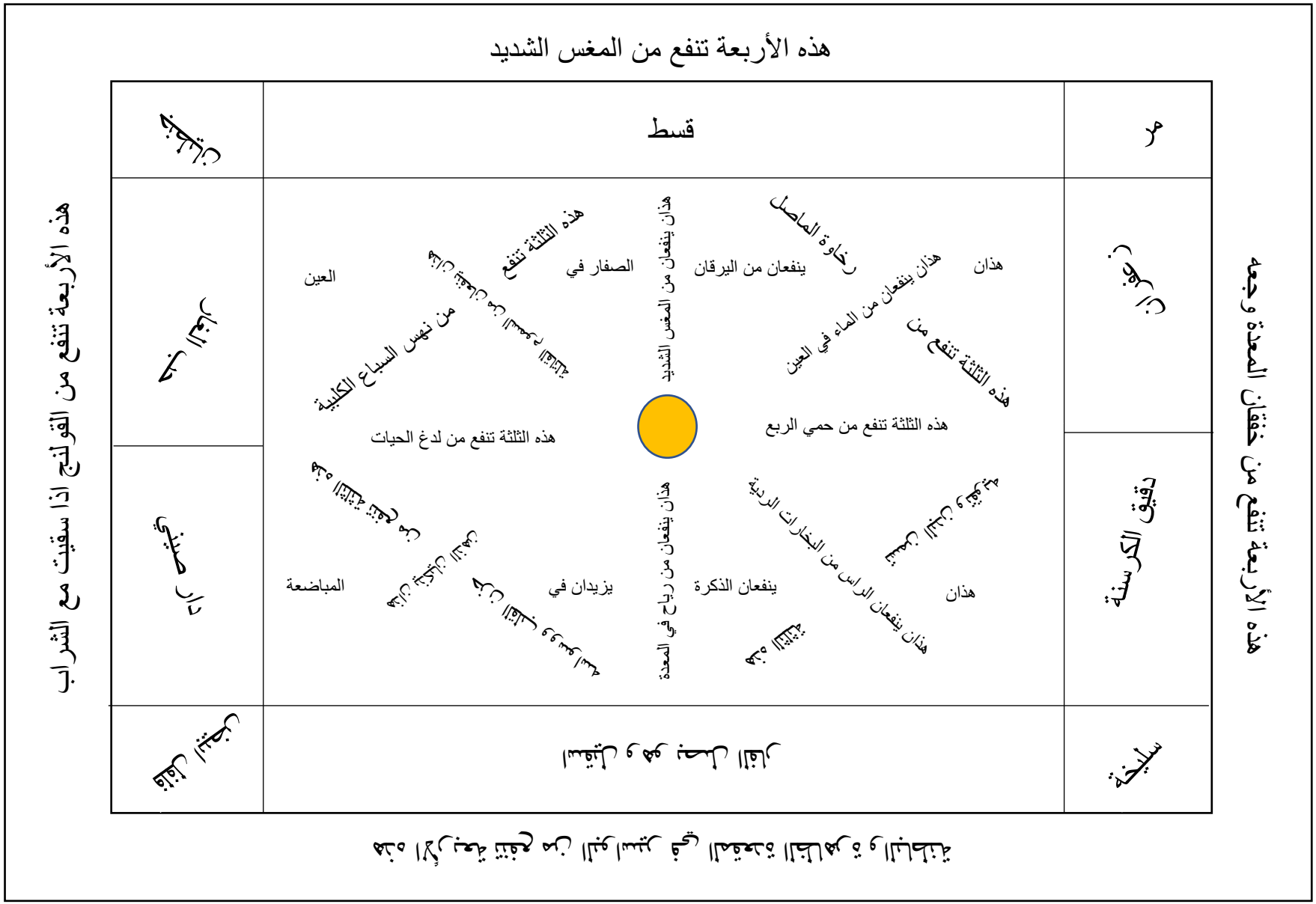


Fig. 1.16b: Diagram 3, drawing by author

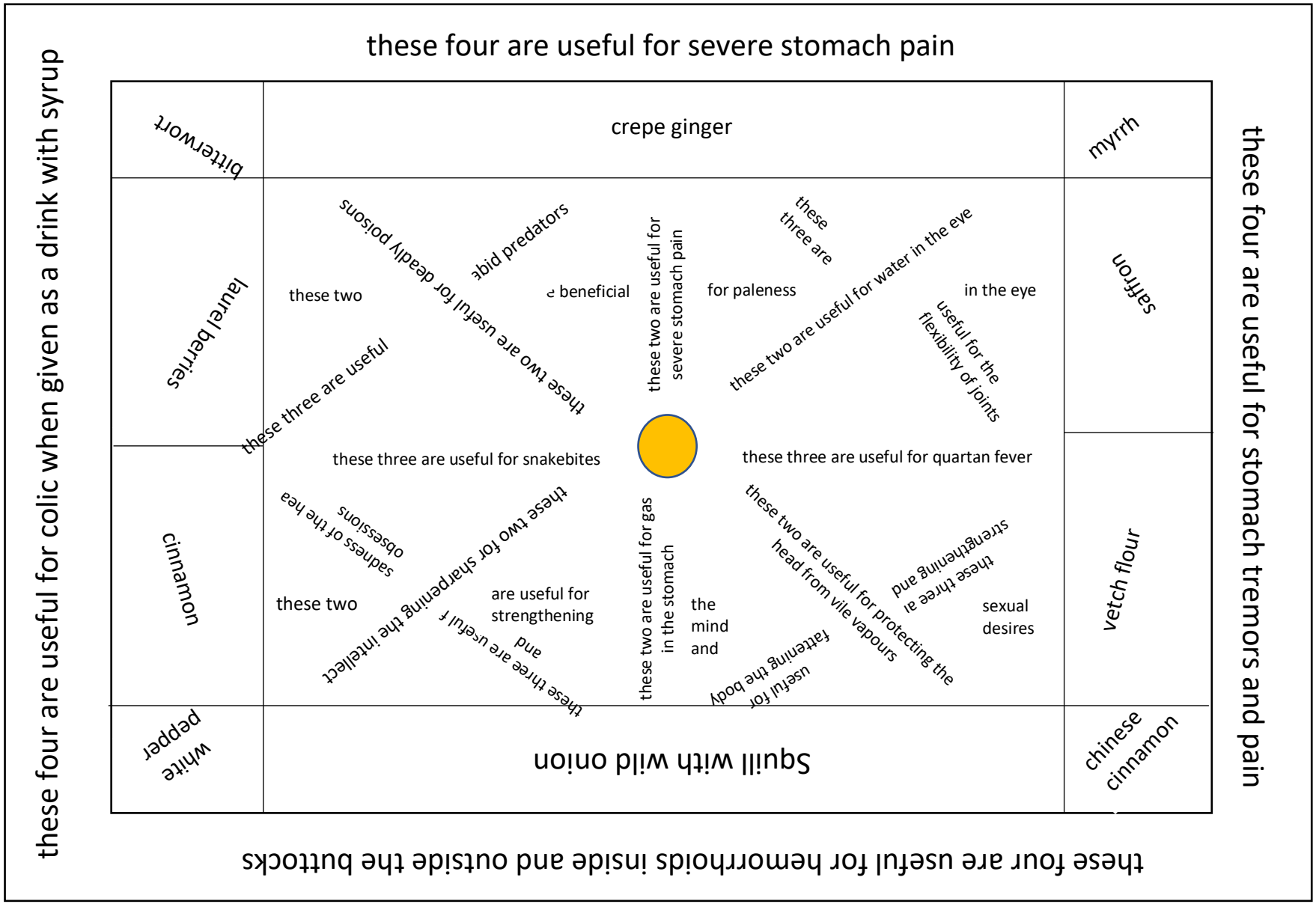


Fig. 1.16c: Diagram 3, translation by author

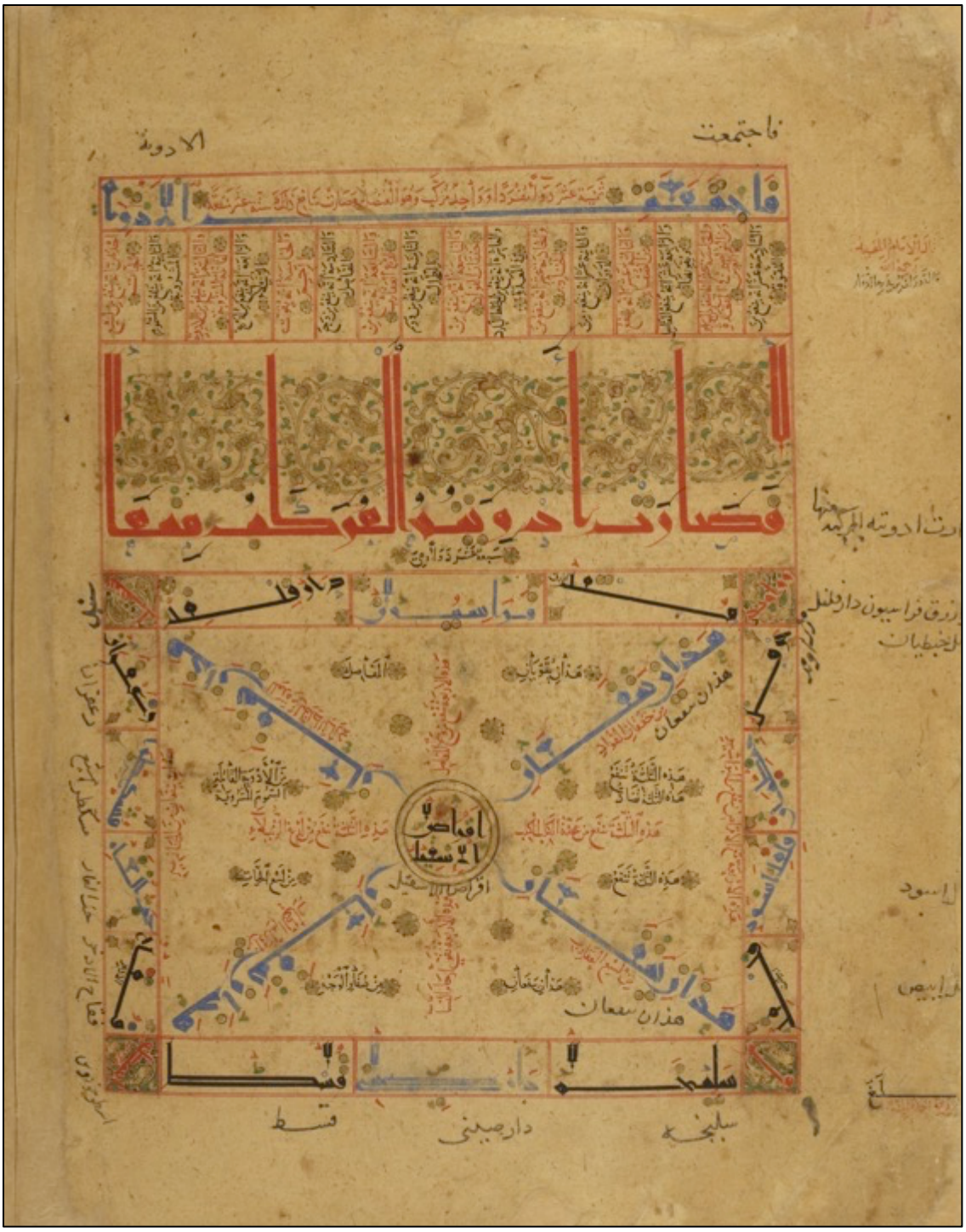


Fig. 1.17: Diagram 4, page 10



Fig. 1.18a: Diagram 5, page 12

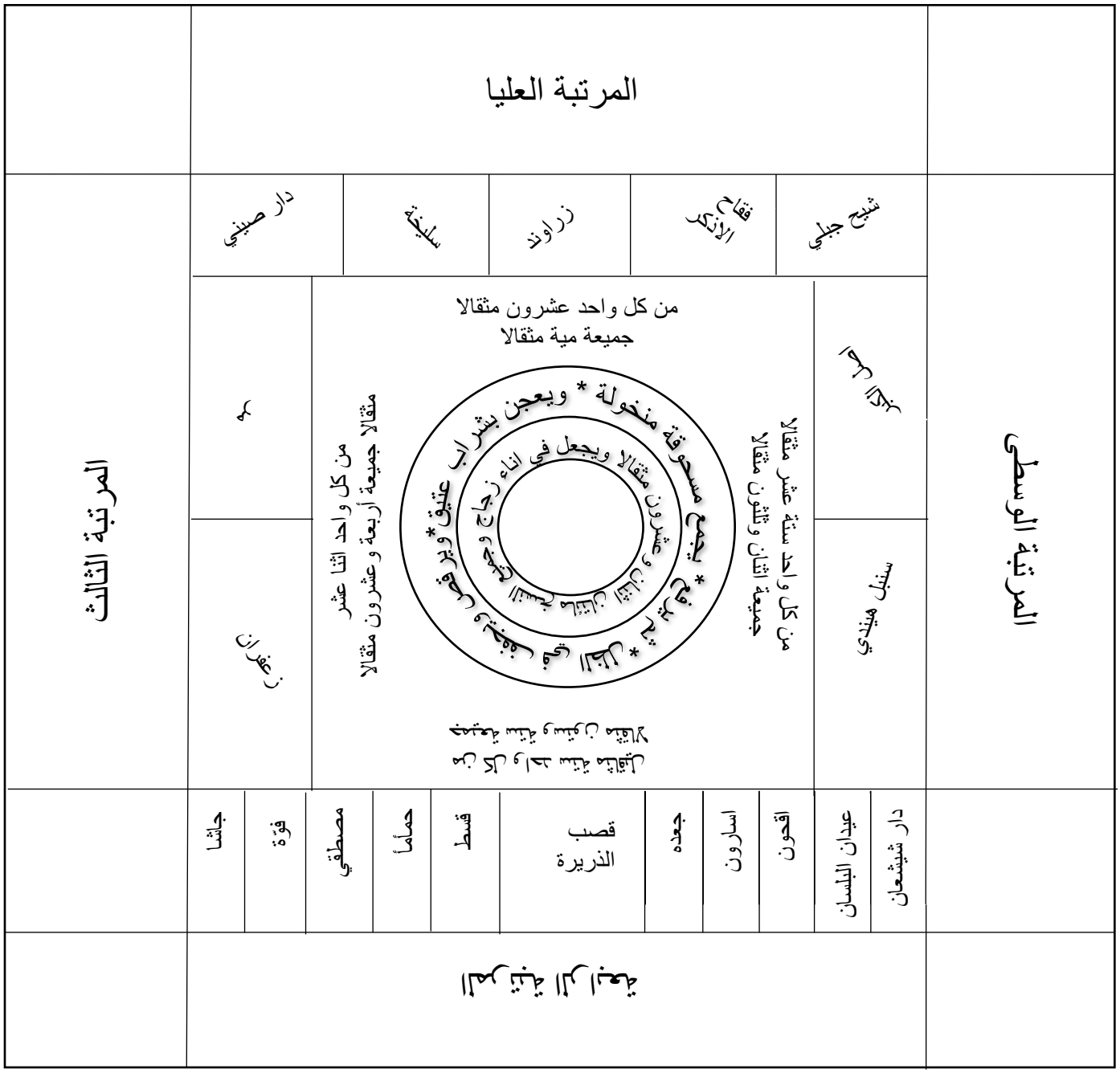


Fig. 1.18b: Diagram 5, drawing by author

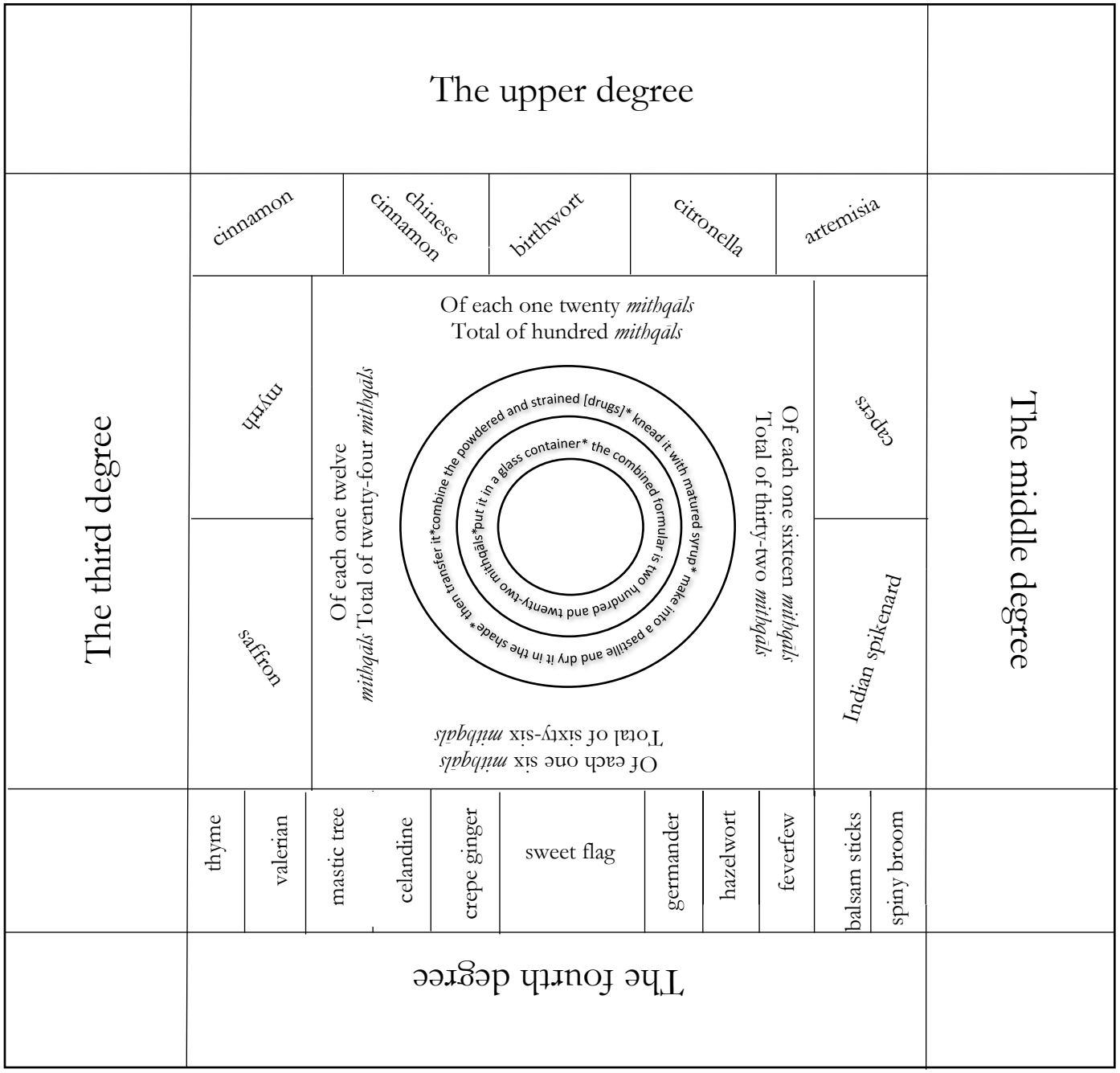


Fig. 1.18c: Diagram 5, translation by author



Fig. 1.19: Diagram 6, page 8

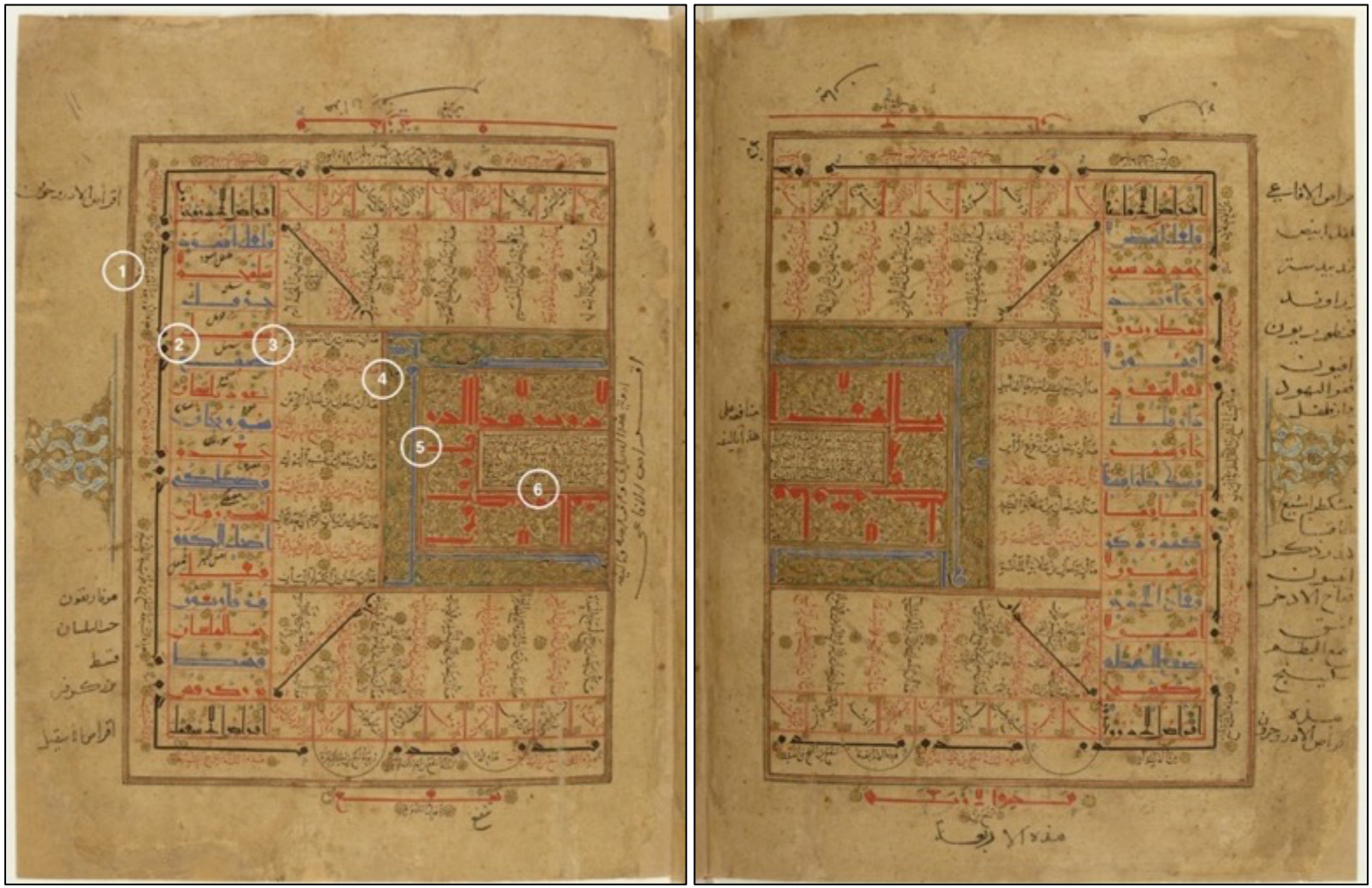


Fig. 1.20: Diagram 8, pages 66-67

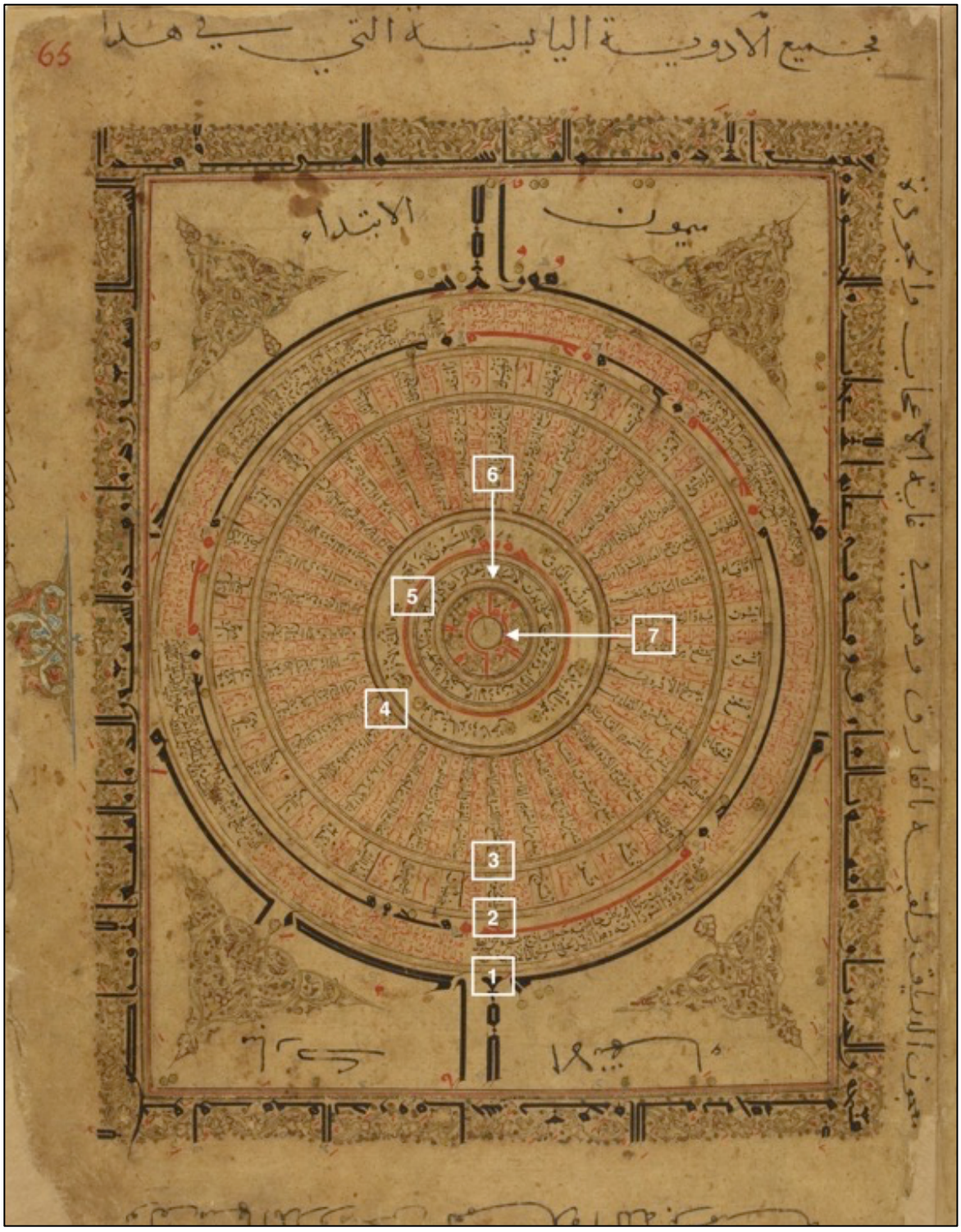


Fig. 1.21: Diagram 7, page 65

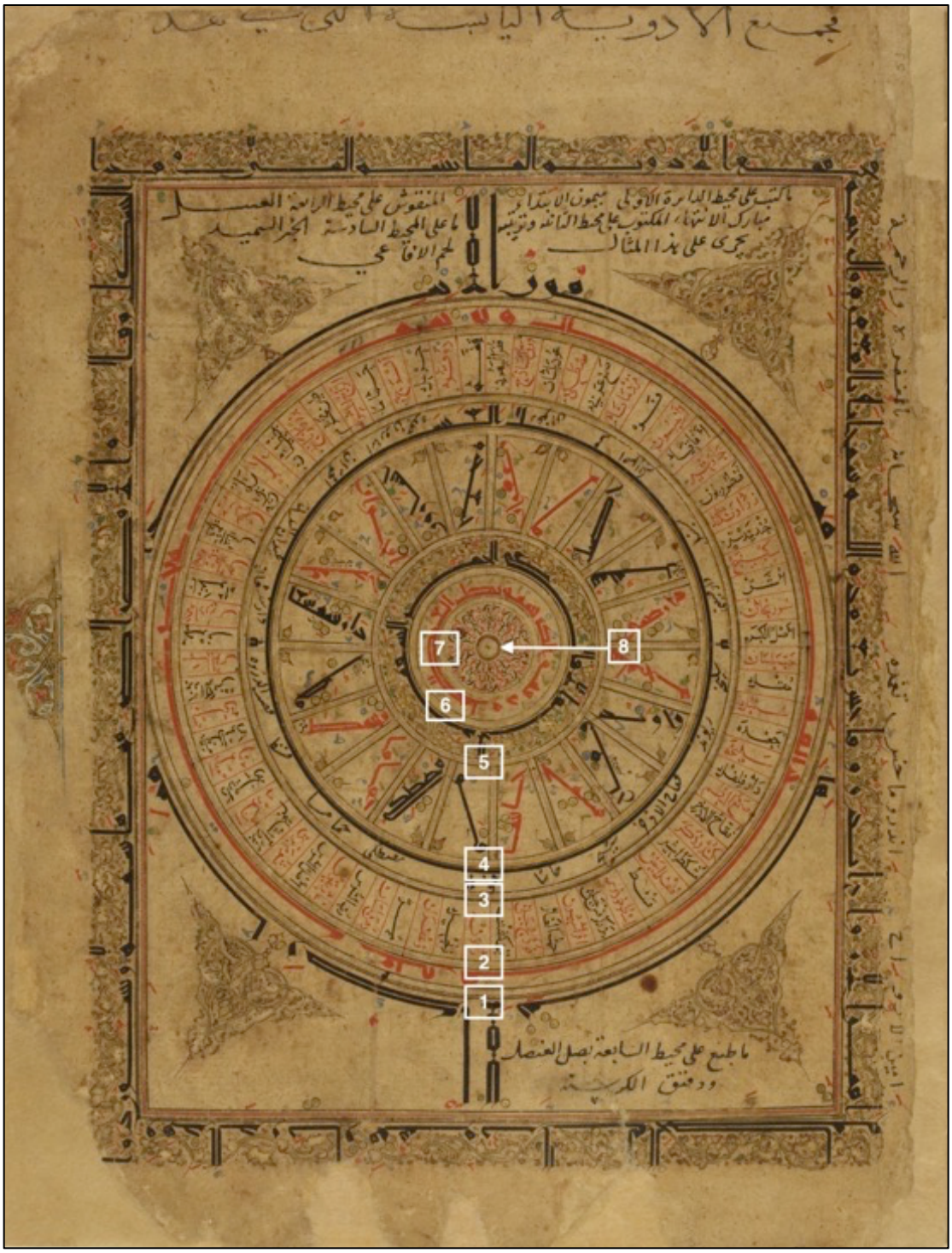


Fig. 1.22: Diagram 9, page 53



Fig. 2.1: Ibn Butlan, *Kitāb Taqwīm al-ṣiḥḥa*, 610 AH/1213 AD.
BL Or. 1347



Fig. 2.3 (above): *Firdaws al-ḥikma*, 13th century. BL Arundel Or 41

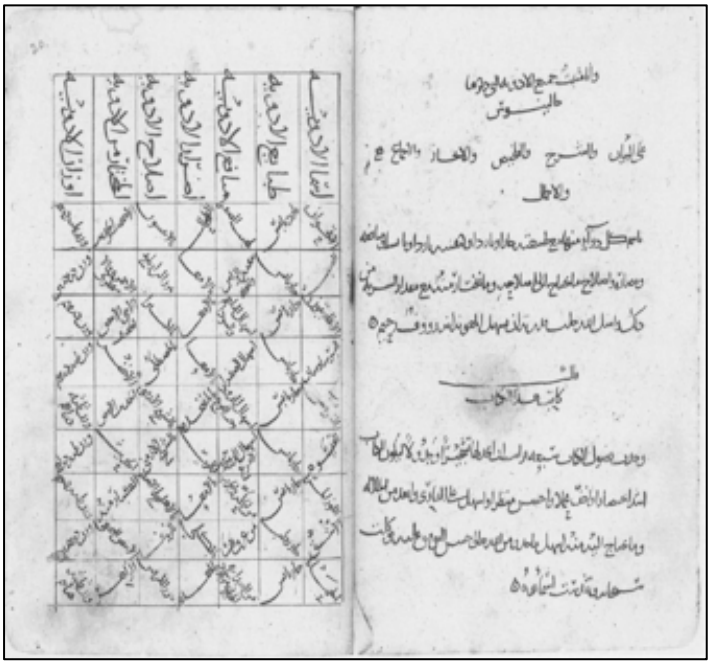


Fig. 2.2: *Kitāb Jawāmi‘ Jālīnūs fi’l-adwiyya al-mufrada*, undated, c. 12th–13th century. Bodleian, MS Hunt. 600

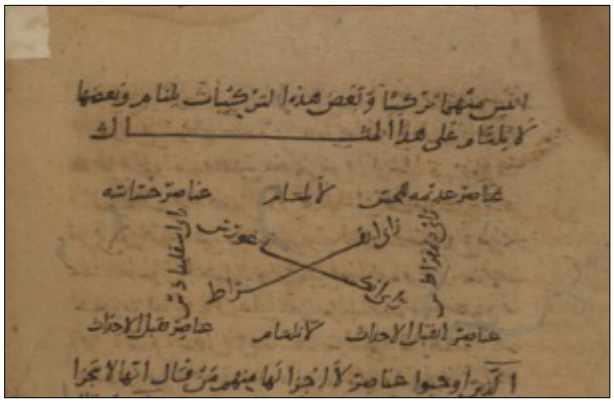


Fig 2.4a: Alexandrian Summaries of three medical texts of Galen, f.3v, 1050–1152. BL Or. 9202



Fig 2.4b: Alexandrian Summaries of three medical texts of Galen, f.12v, 1050–1152. BL Or. 9202

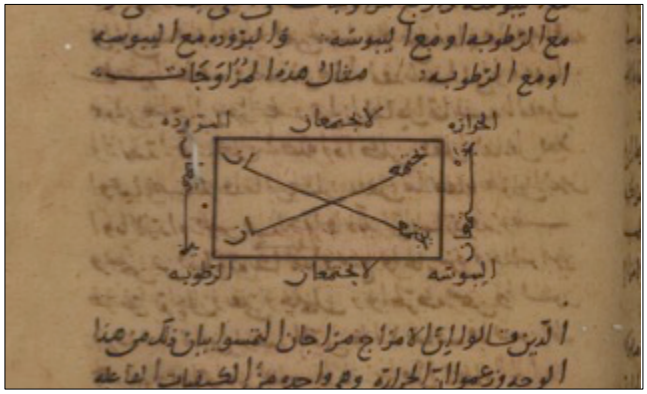


Fig 2.4c: Alexandrian Summaries of three medical texts of Galen, f.21r, 1050–1152. BL Or. 9202



Fig 2.5a: *Jawāmi‘ li-kitāb al-mizāj* (Alexandrian Summary of De temperamentis libri III) translated Hunayn ibn Ishaq, f. 178r, 17th century.
BL Add MS 23407

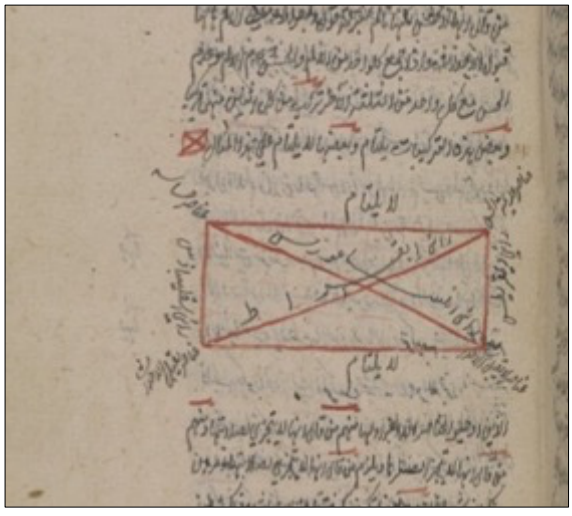


Fig 2.5b: *Jawāmi‘ li-kitāb al-mizāj* (Alexandrian Summary of De temperamentis libri III) translated Hunayn ibn Ishaq, f. 159r, 17th century.
BL Add MS 23407

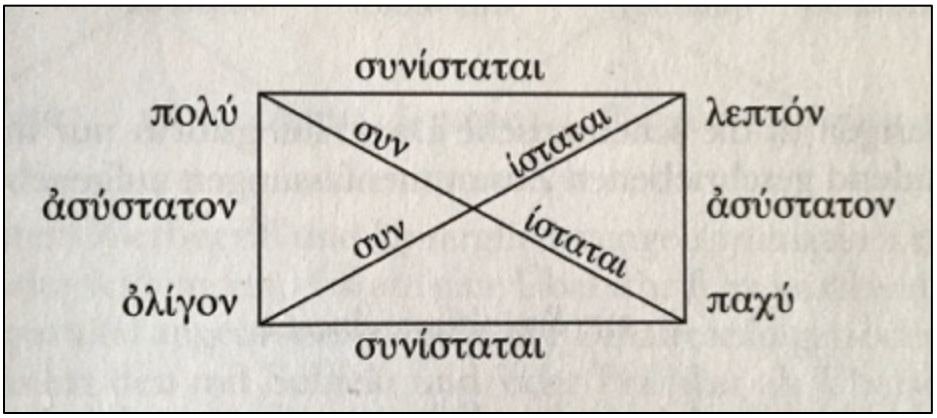


Fig 2.6: *Tabulae Vindobonenses*, f.350r, Medicus Graecus 16, c. 13th–15th century [Reproduced in Gundert, 1998]

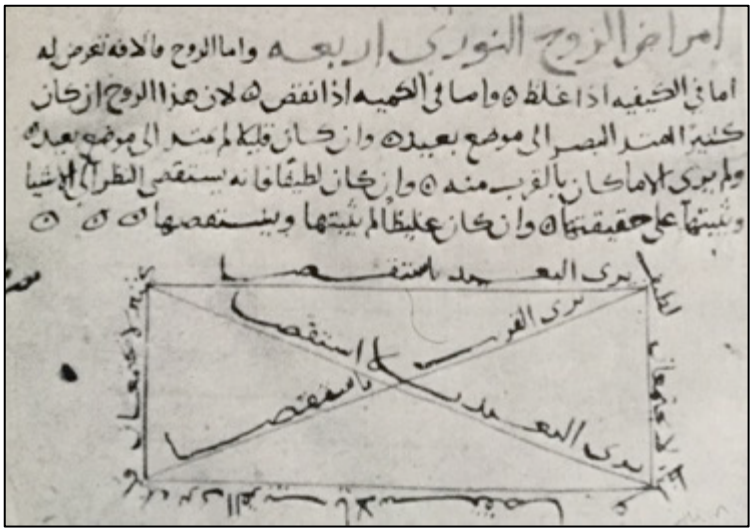


Fig 2.7: Book of Oculists, c. 12th century. National Library of Egypt, Tibb Taymur 100 [Reproduced in Murdoch, 1984]



Fig 2.8: Book of Oculists, 13th century, f. 103b-104a. Chester Beatty Library Ar 4002

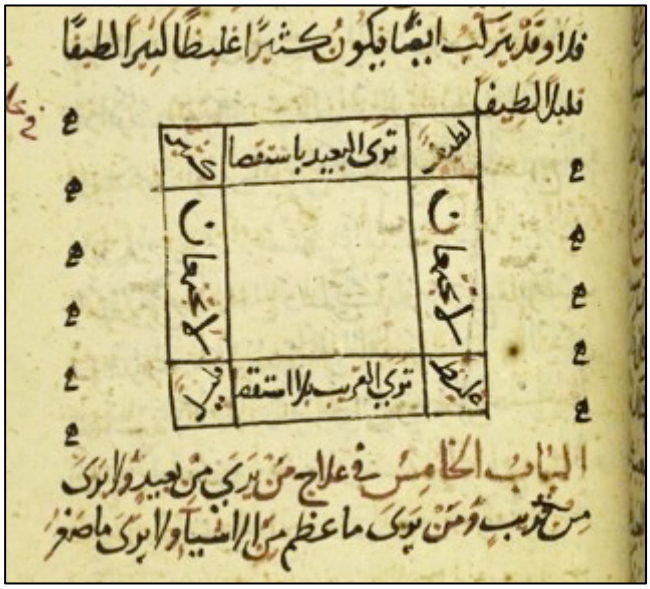


Fig 2.9: Book of Oculists, c.1291.
BL Or. 5856



Fig 2.10: Book of Oculists, c.1291.
BL Or. 5856

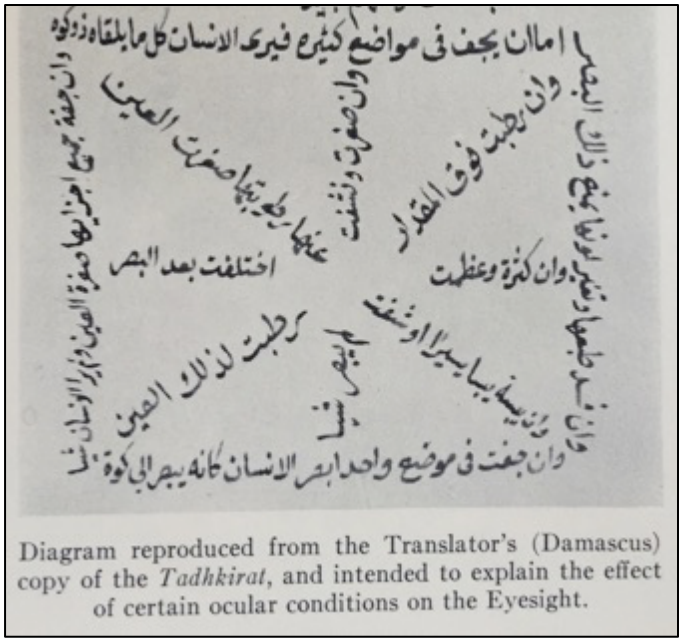


Diagram reproduced from the Translator's (Damascus) copy of the *Tadhkirat*, and intended to explain the effect of certain ocular conditions on the Eyesight.

Fig 2.11: Book of Oculists,
1260 AH/1844 AD, Copied in Damascus
[Reproduced in 'Ali Ibn Isa, trans. Casey A. Wood, 1936]

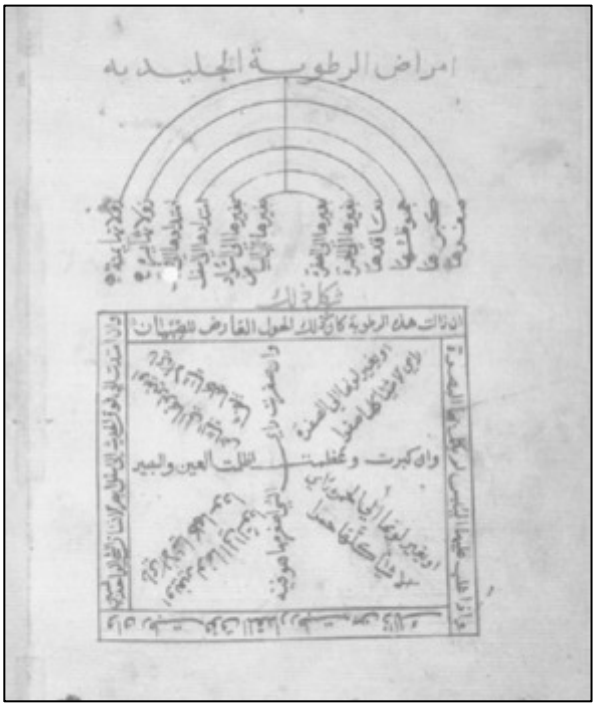


Fig 2.12: *Jawāmi' Kitāb Jālīnuūs fī al-amrād fi al-'ayn*, f. 152b, Chester Beatty Library MS 3425, copy completed in 834 AH/ 1431 AD
[Reproduced in Savage-Smith, 2002]



Fig 2.13: Rectangular map of the world, *Kitāb Gharā'ib al-funūn wa-mulaḥ al-'uyūn,* (Book of Curiosities), dated 1190–1210, Bodleian MS. Arab c. 90, fol. 23a–b



Fig 2.14: Map of Syria, *Kitāb al-masālik wa-mamālik* (Book of Routes and Realms), 696 AH/ 1297 AD. Oxford Bodleian MS Ouseley 373, f. 33b



Fig 2.15: Wind diagram, *'Ajā'ib al-makhlūqāt wa-gharā'ib al-mawjūdāt* (Wonders of Creation), 1300, Mosul, BL Or. 14140

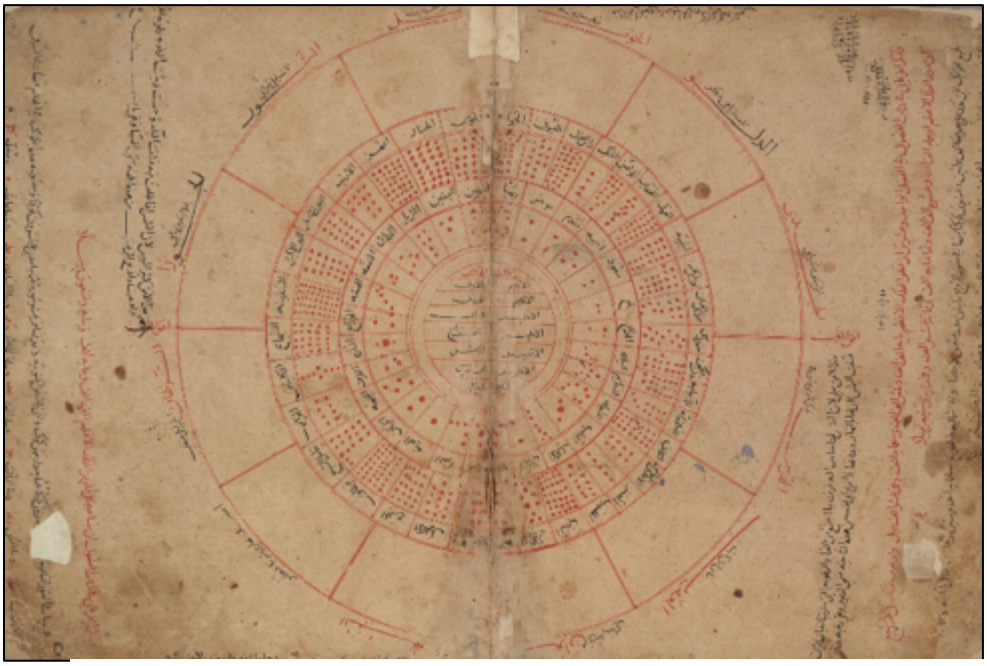


Fig. 2.16 *Kitāb Gharā'ib al-funūn wa-mulaḥ al-'uyūn* (Book of Curiosities), dated 1190–1210, Bodleian MS. Arab c. 90, fol. 2b and 3a



Fig. 2.17 *Kitāb Gharā'ib al-funūn wa-mulaḥ al-'uyūn* (Book of Curiosities), dated 1190–1210, Bodleian MS. Arab c. 90, fol. 5b



Fig. 2.18 Wind diagram, *Kitāb Gharā'ib al-funūn wa-mulaḥ al-'uyūn* (Book of Curiosities), dated 1190–1210, Bodleian MS. Arab c. 90, fol. 21b.



Fig. 2.19 Diagram of spheres, *'Ajā'ib al-makhlūqāt wa-gharā'ib al-mawjūdāt*, c. 1300, BL Or. 14140, fol. 7r



Fig. 2.20 Calendrical wheel, *'Ajā'ib al-makhlūqāt wa-gharā'ib al-mawjūdāt*, c.1280 Staatsbibliothek, cod. Arab. 464



Fig. 2.21 Table of Contents, *Taqwīm al-ṣiḥḥa*, Ibn Butlan, dated to 610 AH/1213 AD, BL Or. 1347



Fig. 2.22 Dār al-Kutub, MS Ṭibb Taymūr 100 [Reproduced in Murdoch, 1984]



Fig. 2.23 Ibn Hawqal, *Book of the Image of the World* Dated 1086, Iraq? Topkapı Saray Museum, Istanbul [Reproduced in Pinto, 2015]



Fig. 2.24 *Kitāb al-masālik wa-mamālik* (Book of Routes and Realms), 696 AH/ 1297 AD. Oxford Bodleian MS Ouseley 373.



Fig. 2.25 Bowl, Nishapur, Iran 10th C. LACMA M.73.5.130



Fig. 3.1 Amulet, paper, verso
Hebrew and Aramaic, Egypt, c. 10–11th C
Cambridge University Library T-S K1.18
(table 2, no. 6)



Fig. 3.2 Amulet, paper
Egypt or Spain, c. 9–14th C
LACMA M.2002.1.370
(table 2, no. 9)



Fig. 3.3 Amulet case, pendant
Afghanistan, 10–11th C
The David Collection 8/197
(table 2, no. 11)



Fig. 3.4 Amulet bezel, haematite
9–12th C, Benjamin Zucker Collection,
cat. 101 (table 2, no. 17)



Fig. 3.5 Birthday horoscope
Egypt, 11–12th C, BL Or. 5565
(table 2, no. 21)



Fig. 3.6 Magical diagram from
Shams al-ma'ārif of al-Buni,
1201–1300, BnF arabe 2647
(table 2, no. 39)



Fig. 4.1 Greek Magical Papyri,
Egypt, 4th C, BL Papyrus 46
(table 3, no. 1)



Fig. 4.2 Amulet of St. Symeon,
Syria, 10–11th C
Skulpturensammlung und Museum für
Byznatininsche Kunst, Berlin 32/73
(table 3, no. 10)



Fig. 4.3 Amulet, block-printed
Egypt? c.11th C, MMA 1978.546.32
(table 3, no. 14)



Fig. 4.4 Seal, carnelian
BM OA+.14309
(table 3, no. 20)



Fig. 4.5 Circle (*dā'ira*) of the basmala (invocation) from *Shams al-ma'ārif* of al-Buni, 1201–1300, BnF arabe 2647 (table 3, no. 39)



Fig. 4.6 Geomantic device
Mosul, 13th C, BM 1888,0526.1
(table 3, no. 41)



Fig. 5.1 Tombstone, marble
Iran, 495 AH/1101–2 AD
LACMA M.71.73.34
(table 4, no. 3)

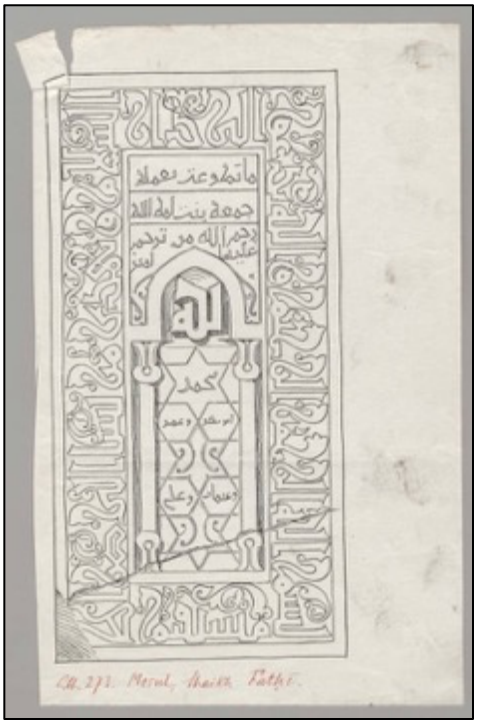


Fig. 5.2 Mihrab drawing
Mosul, 13th C
MMA, Ernst Herzfeld papers
(table 4, no. 6)

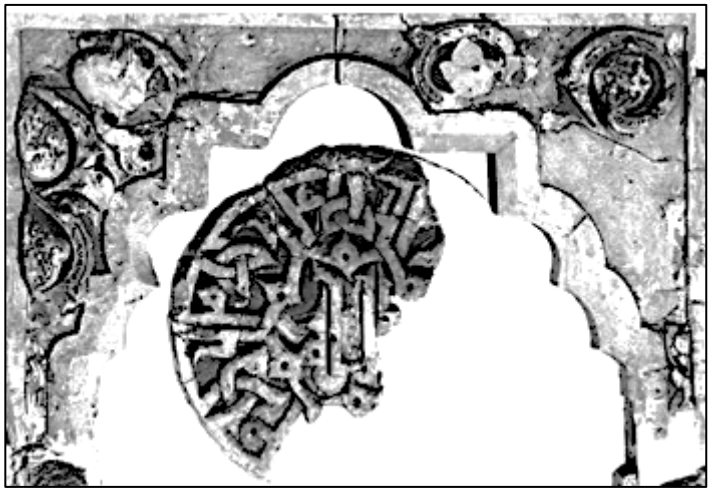


Fig. 5.3a Epigraphic medallion in the Mosque of Nur al-Din Zangi. Mosul, c. 13th C
(table 4, no. 10)
(see its placement in fig. 5.4 mark-up 9 left)



Fig. 5.3b Line drawing and reconstruction of epigraphic medallion by Hamed Yeganehfarzand

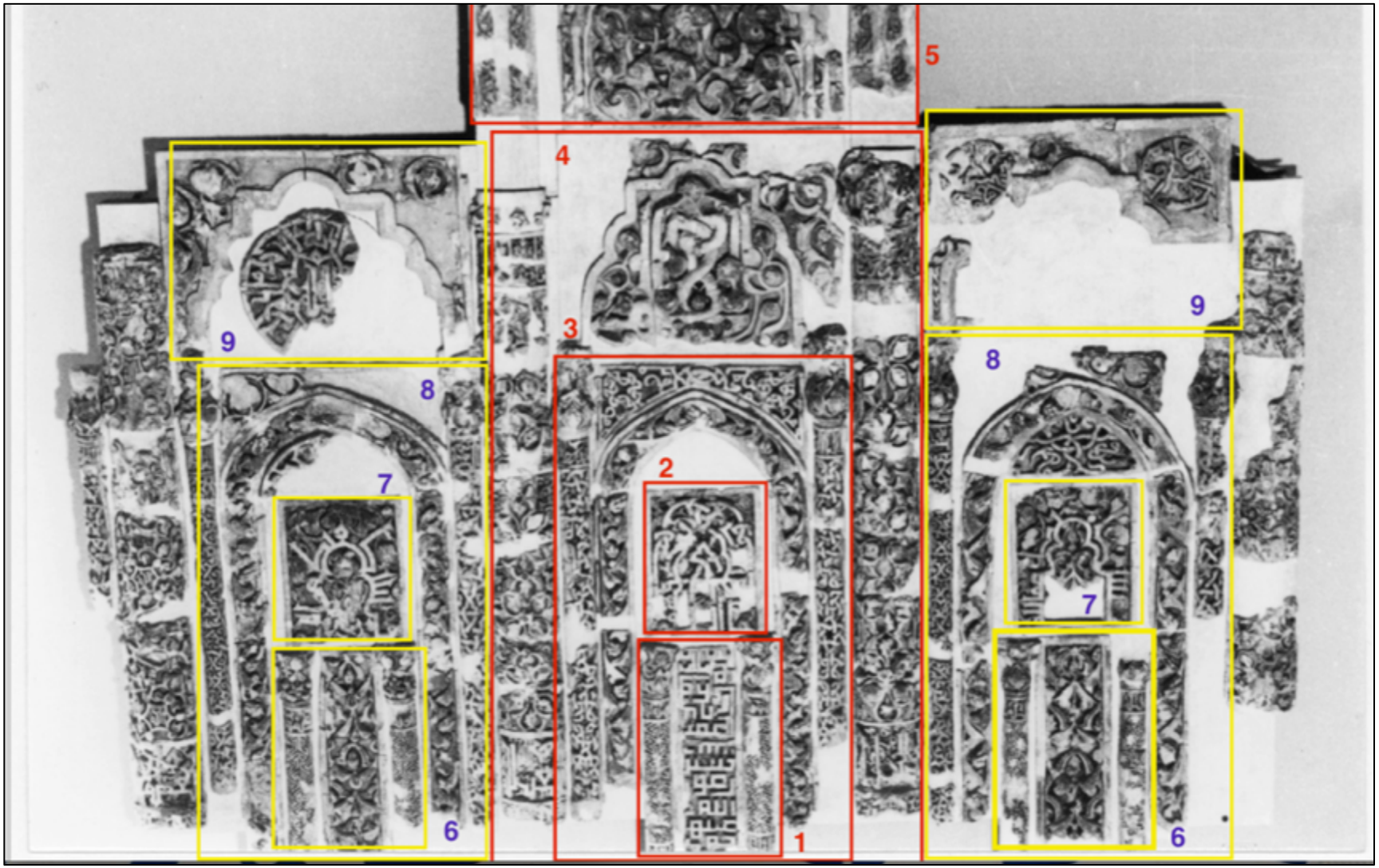


Fig. 5.4 Stucco façade of Mosque of Nur al-Din Zangi. Mosul, c. 13th C
Photo: Yasser Tabbaa archive, Aga Khan Documentation Centre, MIT.
Mark-ups by author

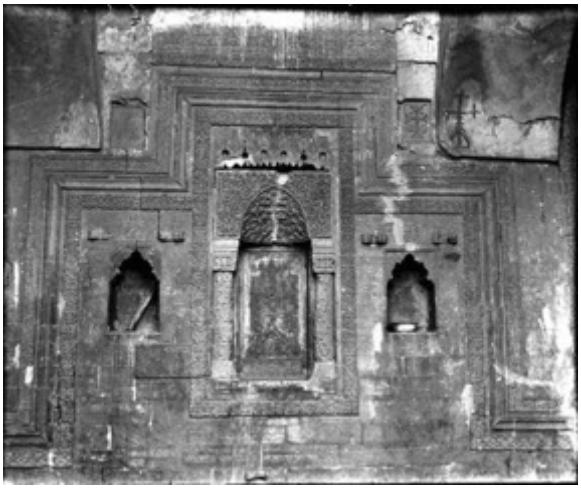


Fig. 5.5 Monastery of Mar Behnam
Gertrude Bell Archive (M_015),
Newcastle University



Fig. 5.6 Mihrab at the Mausoleum of Panja ‘Ali, Mosul
[After Sarre and Herzfeld, 1911]

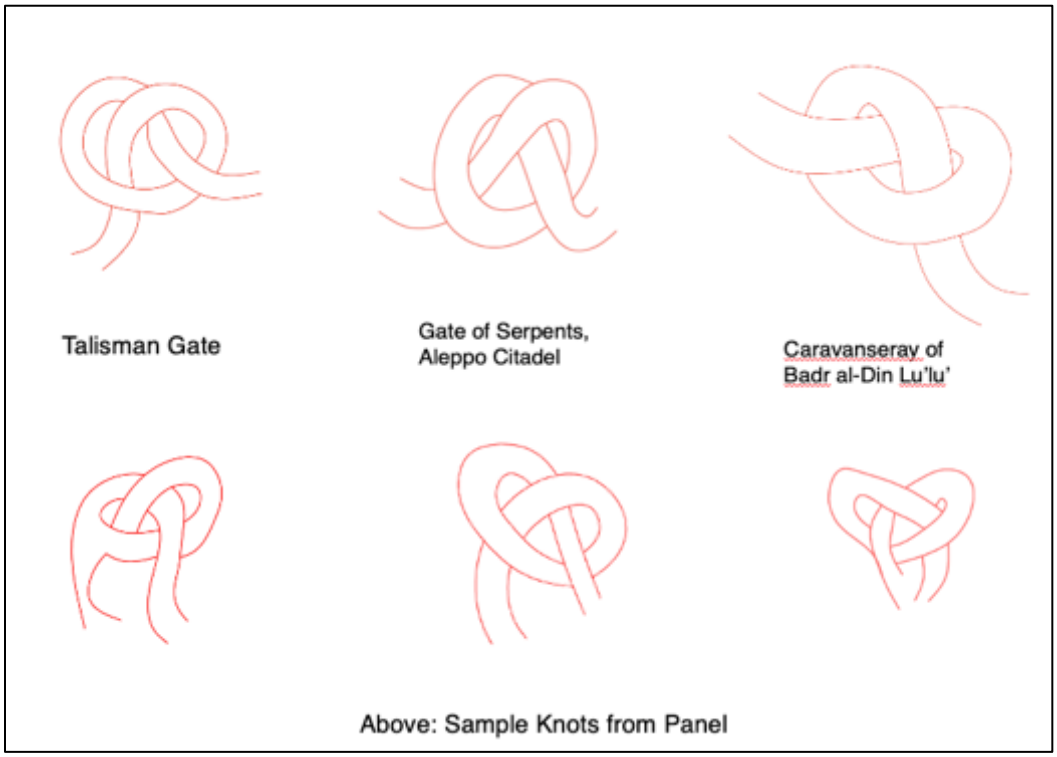


Fig. 5.7 Comparison of heart-shaped knots on stucco panel with knotting motifs in monuments around Jazira. Drawings by author.

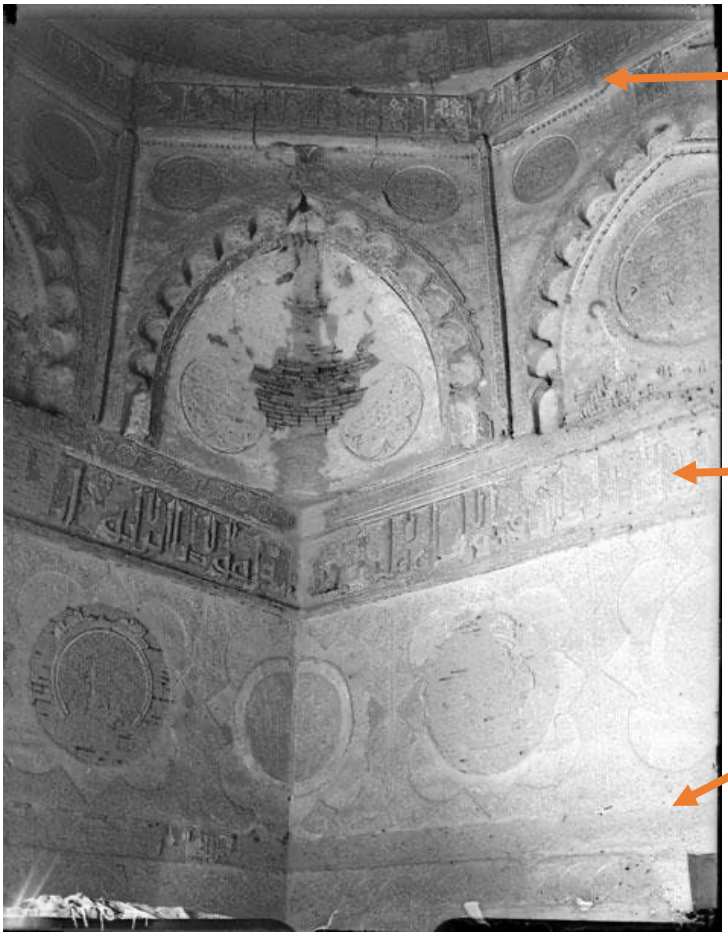


Fig. 5.8 Mausoleum of Shah Fadl
dated 1055–36.
Safid Buland, Kyrgyztan.
Source: Archnet

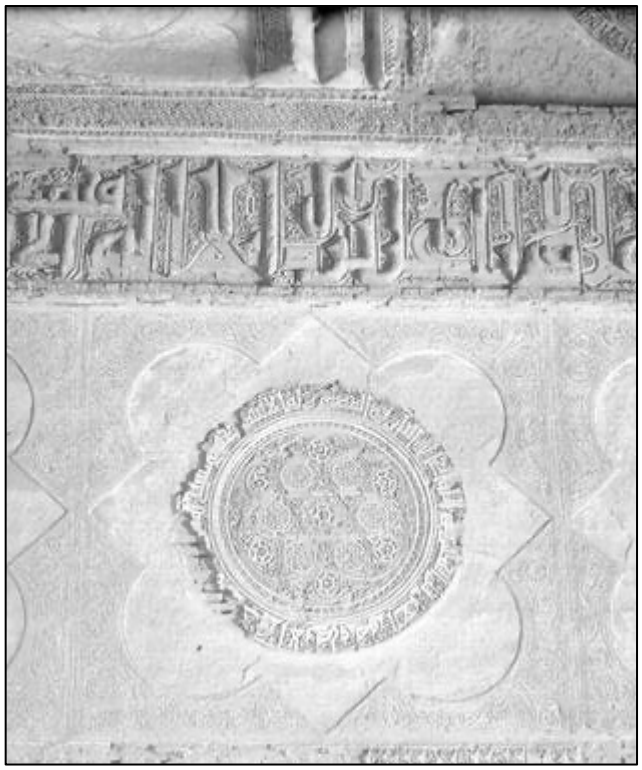


Fig. 5.9 Detail of the epigraphic medallion.
Inscription on the top is Band 2.
Mausoleum of Shah Fadl dated 1055–36.
Safid Buland, Kyrgyztan.
Source: Archnet
(table C, no. 11)



Fig. 5.10 Central mihrab, *mashhad* of Sayyida Ruqayya
Source: Wikimedia Commons



Fig. 5.11a Hexagram detail,
mashhad of Sayyida Ruqayya
Source: Wikimedia Commons
(table C, no. 14)

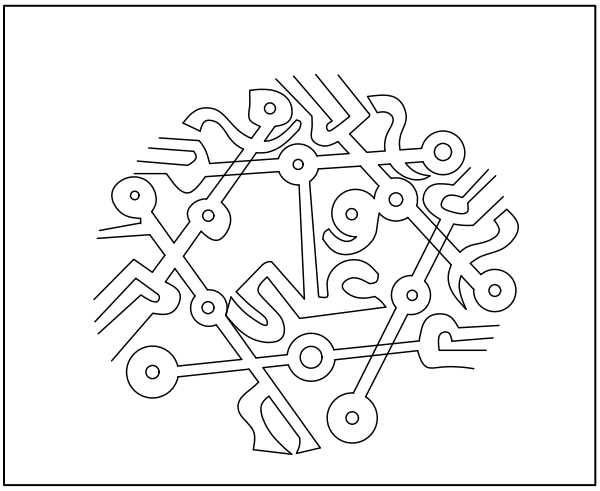


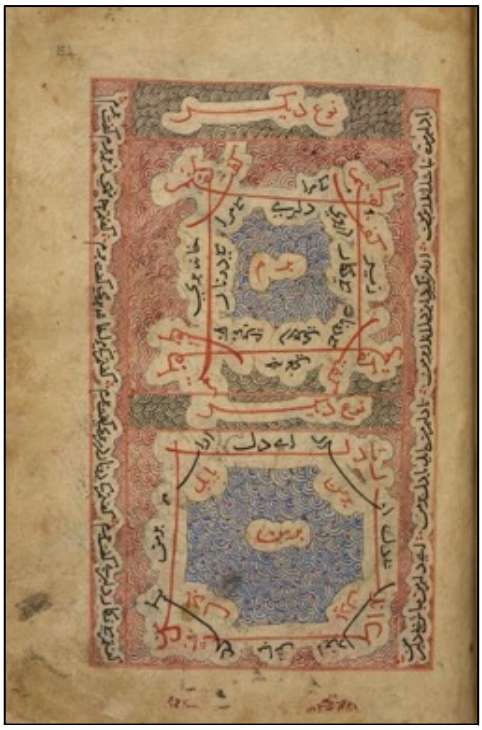
Fig. 5.11b Drawing of hexagram,
mashhad of Sayyida Ruqayya.
Drawing by author



Fig. 5.12 Coin, Nasir al-Din Artuq Arslan
Mardin, 606 AH/1209–10 AD
David Collection, C300
(table C, no. 18)



Fig. 6.1a–b. *Baḥr el-ma'ārif (Sea of knowledge)*, written for the Ottoman prince Mustafa in 1549, copied in 1585. Topkapi Sarayi Museum Library, MS H.659. [Reproduced in Neçipoğlu, 1995]



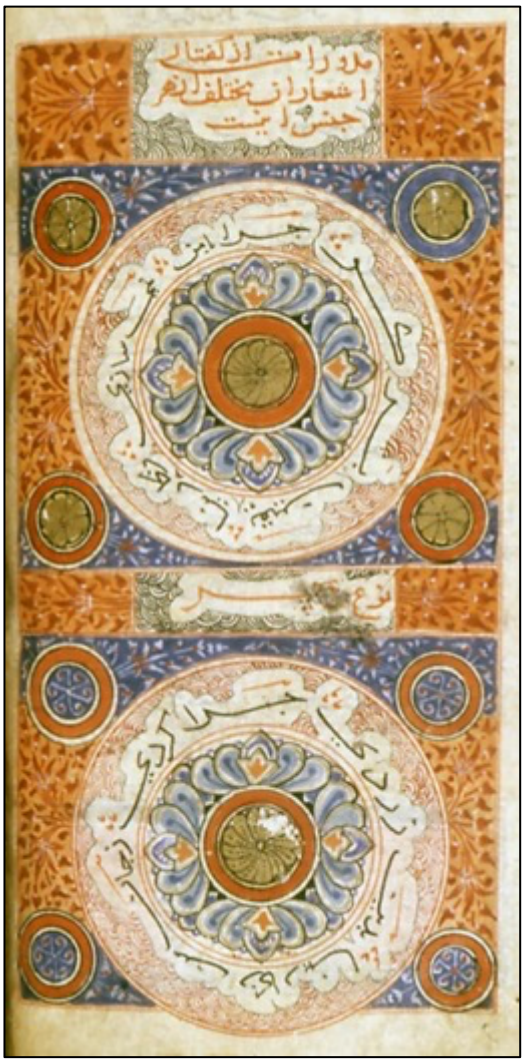


Fig. 6.2a, b: Anthology of Persian Poetry, Jaunpur, 15th century. BL Or 4110





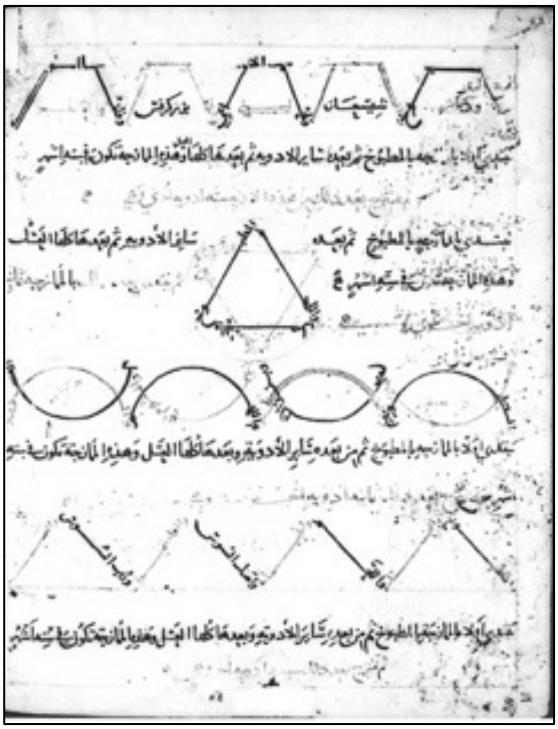
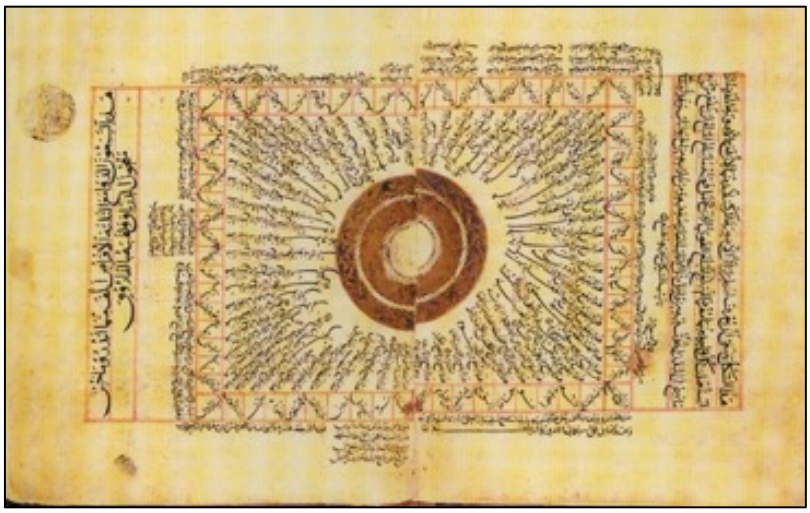
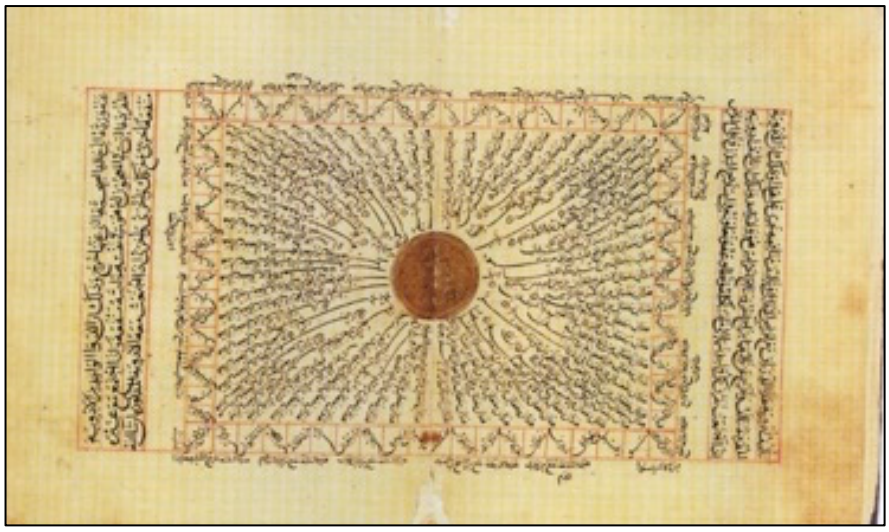


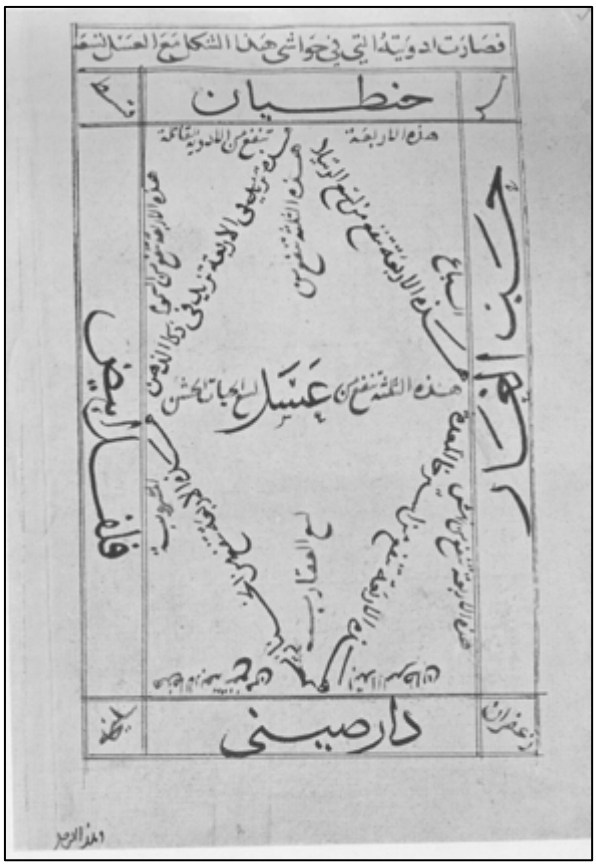
Fig. 6.3a, b, c: *Kitāb al-diryāq*, Nationalbibliothek Vienna AF. 10 [Reproduced in Kerner, 2004]

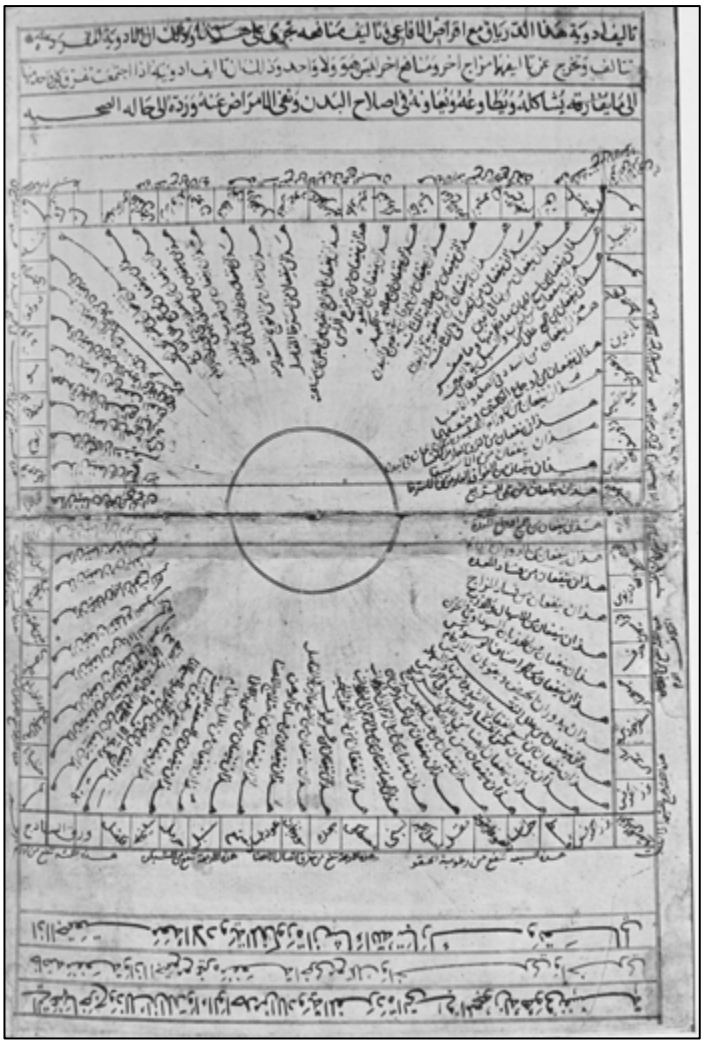






Figs. 6.4a, b, c: *Kitāb al-summum*/*Kitāb al-diryāq*, dated 1224–5, private collection. [Reproduced in Kerner, 2004]





Figs. 6.5a, b: *Kitāb al-diryāq*, 16th C.
National Library of Cairo
[Reproduced in Meyerhof, 1931]



Fig 6.6 Sa‘id ibn Hibat Allah, *Kitāb al-mughnī fī al-ṭibb*, c. 1139, BL Or 3645



Fig 6.7 Chronology of Ancient Nations, Edinburgh University Library, Or. Ms. 161, f. 127v



Fig. 6.8 *Alif* figure, *Laṭā’if al-ishārāt* (*The Subtleties of Signs*), 1382–3.
BnF arabe 2657, fol. 26b



Fig. 6.9 *Rā’* figure, *Laṭā’if al-ishārāt* (*The Subtleties of Signs*), 1382–3.
BnF arabe 2657, fol. 39b