WONDERS of CREATION

ART, SCIENCE, AND INNOVATION IN THE ISLAMIC WORLD

ORGANIZED BY THE SAN DIEGO MUSEUM OF ART
IN COLLABORATION WITH THE MCMULLEN MUSEUM OF ART

By listening and looking, I have learned so many wonderful things, and in considering them carefully I have gained much unexpected wisdom. Now, anxious about being distracted by other demands, I have decided to write everything down so it will not be forgotten.
—Zakariyya ibn Muhammad al-Qazwini (d. 1283)

Nearly eight hundred years ago in Iraq, in the wake of the Mongol conquests, an Islamic judge and professor named Zakariyya ibn Muhammad al-Qazwini wrote the world into a book. A cosmography containing an encyclopedic description of the universe from the heavens to the earth, *ʿAjaʾib al-makhluqat wa gharaʾib al-mawjudat* (*The Wonders of Creation and the Rarities of Existence, or Wonders and Rarities*) sought to record all existence, from ordinary encounters to unfathomable anomalies, as wondrous signs of divine creation. Written in Arabic and Persian with its brilliant integration of established scientific knowledge and popular anecdotes that straddle the boundaries of the real and fantastic, Qazwini's text became one of the most widely copied, illustrated, and translated works of the Islamic world.

Key to his cosmography is an appeal to the reader to pursue knowledge through wonder, which Qazwini defines as perplexity resulting from not knowing the cause or impact of something. Qazwini calls upon our innately human impulse to observe, question, and contemplate natural phenomena, not only for the sake of learning as a pleasurable endeavor in itself, but also to become closer to God. Whether viewed through this Islamic lens or through a universal desire to discover the world, *Wonders and Rarities* provides a framework for understanding the cosmos and navigating one's place within it.

Today, Qazwini's work offers a fresh perspective for learning about the vastly diverse cultures and artistic traditions of the Islamic world. Presenting over 170 works spanning twelve centuries from Spain, North Africa, the Middle East, and Central, South, and Southeast Asia, as well as modern diasporic regions, *Wonders of Creation: Art, Science, and Innovation in the Islamic World* addresses the intersections of Islam, science, and material culture as agents in our efforts to understand our shared world. In the spirit of Qazwini's call to wonder, this exhibition invites you to explore a sampling of our universe.

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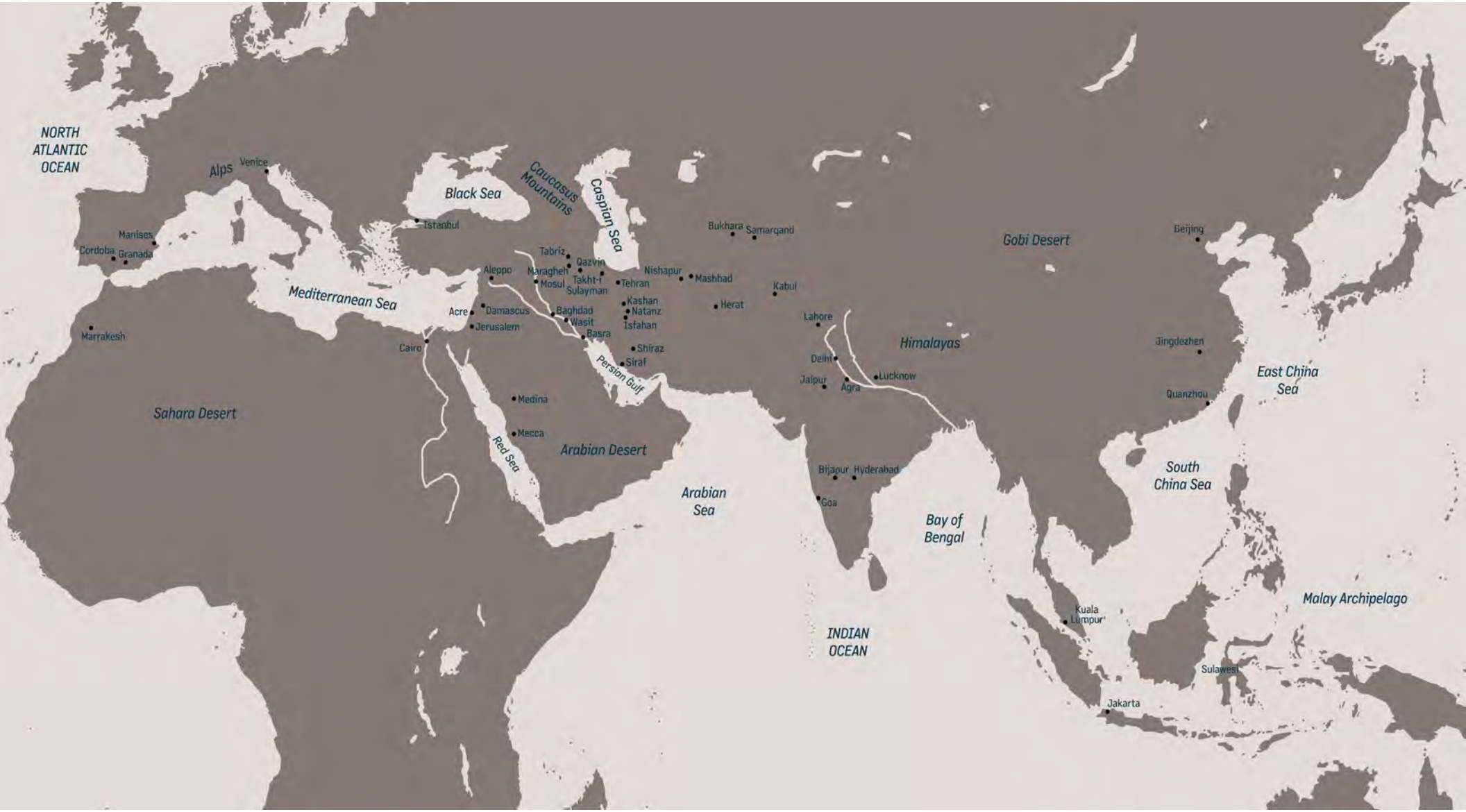
NORTH ATLANTIC OCEAN
Alps
Venice
Black Sea
Caucasus Mountains
Caspian Sea
Istanbul
Bukhara
Samarqand
Gobi Desert
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Qazvin
Aleppo
Maragheh
Mosul
Takht-i Sulayman
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Arabian Sea
Goa
Bay of Bengal
Malay Archipelago
Kuala Lumpur
INDIAN OCEAN
Sulawesi
Jakarta

IN PURSUIT OF WONDER

Zakariyya ibn Muhammad al-Qazwini's cosmography is a natural history describing the universe from the stars and heavens to the seas and lands of earth, concluding with its most minute inhabitants. Written in the aftermath of the Mongol invasions, *Wonders and Rarities* organized a turbulent world into a brilliantly crafted book that simultaneously offers knowledge and diversion. Its captivating introduction, which contains a definition of wonder stemming from Platonic and Aristotelian philosophy, shaped the idea of wonder in the Islamic world: "Wonderment is said to be a state of perplexity that comes over a human being when he fails to understand the reason for a thing or how it affects him."

Today, we associate wonder with a variety of ideas, including the *Wunderkammern* (wonder cabinets, or cabinets of curiosities) of early modern Europe that preceded the universal museums of the Enlightenment, the desire to seek knowledge about what we do not understand, and the feeling of awe at encountering something rare or extraordinary. Qazwini's concept of wonder focuses on defamiliarizing the familiar, with the ultimate goal of purifying the soul by achieving progressively higher states of knowledge through the contemplation and appreciation of divine creation.

QAZWINI AND HIS WORLD

Zakariyya ibn Muhammad al-Qazwini was born in 1202 to a family of Arab jurists in Qazvin, Iran. During his lifetime, he survived Genghis Khan's Mongol invasion, which devastated Central Asia and northern Iran in 1220–21, and Genghis Khan's grandson Hülegü's conquest, which destroyed Baghdad and the Abbasid caliphate in 1258. In 1220, Qazwini fled west to Mosul, Iraq, where he trained at a madrasa, an Islamic college, under leading scholars in the philosophical and natural sciences.

By the second Mongol campaign, Qazwini was a renowned judge and professor in Wasit, Iraq, remaining there under the Mongol Ilkhanid rulers (1256–1353). Thriving under the new regime, Qazwini's world had nevertheless been upended. He found solace in the familiar genre of the cosmography, which offered a world of knowledge and order alongside diversion. Appealing to courtly, scholarly, and pious audiences, *Wonders and Rarities* would reach readers beyond Qazwini's death in 1283 through multiple copies and translations.

Issam Kourbaj (British Syrian, b. 1963)

Dark Water, Burning World

Installation of twenty boats
2016–18
Repurposed bicycle steel mudguards, extinguished matches, clear resin
Loaned by the artist (nineteen); and the San Diego Museum of Art, Museum Commission, 2024.29

Dark Waters, Burning World evokes wonder through the transformation of commonly discarded materials into miniature boats carrying imperfect clusters of huddled figures, each vessel positioned as part of an ensemble that suggests movement through turbulent waters. Just as Qazwini's cosmography compiled knowledge into a book meant both to inform and to entertain, Issam Kourbaj simultaneously enlightens and engages his audience through this work.

This fleet is one of many made by Kourbaj to underscore the tragic stories of people fleeing the artist's native Syria since the beginning of its civil war in 2011. Distraught by the crisis, Kourbaj felt compelled to act, resolving to devote his artistic practice to informing the world about what was happening—or to remind the world, lest it forget. *Dark Water, Burning World* was prompted by the dire conditions of Syrian refugees in camps on the Greek island of Lesbos in 2015–16. Kourbaj worked with poet Ruth Padel to ensure no one would forget their circumstances or the kindness of the islanders who embraced them.

Remembering a display at the Fitzwilliam Museum of miniature model boats excavated from the fifth-century BCE Syrian port of Tartus, said to portray goddesses at sea, Kourbaj created a counterpart through his own contemporary fleet. Reflecting on the ironic contrast between the two collections, the artist has remarked that his "homeland used to send goddesses to the Mediterranean; in the twenty-first century, it's sending refugees."

In 2017, Kourbaj exhibited his first fleet at the Fitzwilliam Museum in dialogue with the ancient model boats. On the sixth anniversary of the war, which coincided with the exhibition, Padel recited her poem "Lesbos 2015," an excerpt of which appears below:

> "...and their stories our stories,
> steered by the small
> star-light of cell phones
> waves like rings of a tree
> rings of the centuries
> rocking and spilling
> on the windy sea..."

Alms bowl (*kashkul*) with dervishes and a mounted falconer

Iran, 1280 AH (1880–81)
Coco-de-mer shell and brass; carved and inscribed
Brooklyn Museum, Henry L. Batterman Fund, 47.203.5

A common attribute of the Sufi dervish, or Muslim mystic, this *kashkul* or alms bowl was made from half of a coco-de-mer palm nutshell. Persian verses around the bowl praise the virtue of dervishes, a group of them portrayed on top with two *kashkuls*. Used to collect donations or to contain food or drink, the bowl symbolizes the emptying of the Sufi's ego through renunciation of worldly goods and aspirations, and the nourishment of the soul with divine knowledge through the contemplation of God.

Although *kashkuls* are produced in other media, the coco-de-mer nutshell carries special significance: native to islands of the Indian Ocean, such shells probably washed up on Iran's southern shores, their lengthy sea voyage a metaphor for the Sufi's mystical journey. Not only could a shell like this be among the natural wonders Qazwini recounts, but its travels both before and after its transformation into a *kashkul* echo the distances Qazwini's cosmography traversed through its many copies and translations.

Double frontispiece

Bifolio from a manuscript of *The Wonders of Creation and the Rarities of Existence*

Iran, Shiraz, 823 AH (1421)
Ink, opaque watercolor, and gold on paper
The Metropolitan Museum of Art, Fletcher Fund, 1934, 34.109

This frontispiece identifies the cosmography's title in the central roundel at right and praises its author, Qazwini, as an icon of knowledge and piety in the facing roundel through a genealogical link to the Prophet Muhammad's companions. The pairing of Persian verses by the philosopher and mystic Baba Afzal Kashani (d. ca. 1214) with images of real and fantastic creatures surrounded by a border of scrolling vegetation terminating in different animal heads provides a preview of the entire cosmography:

> *Foremost of all generated beings are intellect and soul*
> *Following after are the nine revolving heavens*
> *Past all these are the four pillars of the elements*
> *Then minerals, then plants, and then animals.*

The manuscript to which the frontispiece belongs is housed in Istanbul's Topkapı Palace in the royal archives of Ottoman Sultan Bayezid II (r. 1481–1512).

The Earliest Copy

The oldest surviving manuscript of *Wonders and Rarities* is believed to have been completed in Wasit, Iraq, by Qazwini himself just three years before his death. Written in Arabic, it contains 213 surviving folios with a staggering 475 illustrations, highlighting the significant role images played in communicating this text even during the author's lifetime.

Opening rosette from a manuscript of *The Wonders of Creation and the Rarities of Existence*. Iraq, Wasit, 678 AH (1280). Ink and opaque watercolor on paper, leather binding. Bayerische Staatsbibliothek, München, Cod. arab. 464, f. 1r.

Inkwell and lid

East Iranian world, ca. 1200
Bronze inlaid with silver and copper
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 123 M

Pen box (*qalamdan*)

Iran, ca. 12th–13th century
Bronze inlaid with silver
Islamic Arts Museum Malaysia, 2014.2.4

As they traversed Iran and Central Asia, the Mongol invasions prompted unprecedented population movements as refugees fled or were forcibly relocated from their homes. Scholars and artisans traveled with the portable tools of their trades, like this bronze inkwell and pen box. Such objects carried practical as well as aesthetic and personal value, often inlaid with silver and copper, decorated with geometric, vegetal, or figural imagery, and engraved with blessings to the owner. An inscription on the inkwell, which would have been attached to loops for hanging from a belt, names its owner, Badr al-Din Fakhr al-Khawass Muqbil al-Zahrani, and contains inscriptions wishing him glory, prosperity, happiness, and longevity.

Sheep (gusfand)

Folio from a manuscript of the *Kitab Tabaʾiʿ al-hayawan wa khawasiha wa manafiʿ aʿdaʾiha* (Book of the characteristics of animals, their attributes, and the usefulness of their organs)
Iran (Tabriz or Kashan) or Iraq (Baghdad), early 14th century
Ink, opaque watercolor, and gold on paper
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 31 MS

This folio from a Persian translation of an eleventh-century Arabic treatise on the physical characteristics of animals depicts a pair of falcons, a ram, and a ewe in the familiar convention of contemporary bestiaries depicting species in male-female pairs; a bold heading in Kufic script signals the beginning of the next chapter on the benefits of sheep parts. Derived from Aristotelian sources, the original text was translated into Persian in the late thirteenth century for the Mongol Ilkhanid ruler Ghazan Khan (r. 1295–1304).

Folio from a manuscript of the *Athar al-bilad fi akhbar al-ʿibad* (Remnants of the regions and reports of the pious) by Qazwini

Ottoman Türkiye, 16th or 17th century
Ink and opaque watercolor on paper
Museum of Fine Arts, Boston, Horace G. Tucker Memorial Fund and Seth Augustus Fowle Fund, 24.130

Toward the end of his life, Qazwini also authored a complementary geographical treatise in Arabic. This folio represents a later illustrated copy of this text. Much like his cosmography, the *Athar al-bilad fi akhbar al-ʿibad* weaves together established facts with popular traditions, religious parables, and historical anecdotes. Derived from ancient Greek and early Islamic geographical literature, the text includes entries on towns, rivers, mountains, and islands addressing characteristics of individual settlements and people. In the present folio, a group of large-eared creatures are depicted drinking from different sources of water, as described in the surrounding text.

QAZWINI'S COSMOGRAPHY

Wonders and Rarities is a natural history describing the universe and its phenomena. Excerpts from its two major discourses, on the celestial and terrestrial realms, are displayed here on pages from copies of the cosmography produced in Iran, India, and Türkiye. Along with other surviving examples in Arabic, Persian, or Ottoman Turkish from the thirteenth through the nineteenth centuries, they represent some of the variations in the text and its illustrative programs. A number of Persian copies originating from Qazwini's lifetime, for example, include an expanded discussion on human diversity and crafts. Enabled by the flexible structure of the original text, these differences reflect the diverse tastes and concerns of patrons and shed light on the sources available to the scribes and artists producing each manuscript.

RIGHT: *The Constellations Aries* (al-Hamal) *and Taurus* (al-Baqara)

LEFT: *The Constellations Gemini* (al-Taw'amayn) *and Cancer* (al-Saratan)

Manuscript of *The Wonders of Creation and the Rarities of Existence*
Iran, probably Shiraz, 1450–1500
Ink, opaque watercolor, silver, and gold on paper; leather binding
The al-Sabah Collection, Dar al-Athar al-Islamiyyah,
Kuwait, LNS 20 MS (a), ff. 15v–16r

Illustrations in manuscripts of *Wonders and Rarities* evolved to include additional information on relationships between planets and the zodiac. In this Persian copy opened to entries on four zodiac signs, the traditional iconography for Gemini—twins conjoined at the hips—is altered to show the twins holding a dragon-headed staff between them. Their lower bodies end in intertwining dragon tails, a reference to the pseudo-planet *Jawzahr*, the "eclipse dragon" who controls eclipses by swallowing the sun and moon.

RIGHT: *The Dyer's Oak* (ʿafs) *and Jujube* (ʿunnab) *Trees*

LEFT: *The Common Service Tree* (ghubayraʾ), *Weeping Willow* (gharab), *and Peony* (fawaniya)

Manuscript of *The Wonders of Creation and the Rarities of Existence*
Iran, Shiraz, mid-15th century
Ink, opaque watercolor, and gold on paper; leather binding
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 2 MS, ff. 57v–58r

In the cosmography's section on the terrestrial realm, the plant kingdom is subdivided into plants with trunks (trees) and those without (herbs). Qazwini writes about the wondrous qualities of trees. He contemplates every step related to their nourishment and growth and marvels at their leaves, considering them "an amazing aspect of the Creator's handicraft" because they provide ornament and protection.

Solar Eclipses and the Properties of the Sun

Folio from a manuscript of *The Wonders of Creation and the Rarities of Existence*
India, Bijapur, 16th century
Ink and opaque watercolor on paper
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 97 MS (b)

This folio from a Deccani copy of the cosmography includes a diagram to accompany an explanation of solar eclipses in the section on the superlunar (celestial) realm, which precedes the heading for the chapter on the properties of the sun. The image illustrates differences in the moon's positions, which result in a partially or fully eclipsed sun.

Diagram of the Surrounding Sea and the Seas That Adjoin It

Folio from a manuscript of *The Wonders of Creation and the Rarities of Existence*
India, Bijapur, 16th century
Ink and watercolor on paper
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 97 MS (d)

Qazwini's discussion of the sublunar (terrestrial) realm begins with the four elements—fire, wind, water, and earth. From the section on water, this folio (from the same manuscript as one depicting solar eclipses nearby) describes the Surrounding Sea. The origin of the seven seas, the Surrounding Sea was often depicted as a body of water encompassing inhabited lands.

ʿAbd al-Majid (scribe)

The Islands and Strange Animals of the China Sea

Manuscript of *The Wonders of Creation and the Rarities of Existence*
Northern India, Rajab al-murajab, 976 AH (December 1598)
Ink, opaque watercolor, and gold on paper; leather binding
Islamic Arts Museum Malaysia, 2011.7.40, ff. 68b–69a

Designed to entertain as well as inform, *Wonders and Rarities* weaves stories from popular tradition with established scientific knowledge. Qazwini often cites sources such as Aristotle or the medieval Islamic philosopher and physician, Ibn Sina (Avicenna). These folios come from the cosmography's section on the China Sea.

The island of Aturan is said to be inhabited by rhinoceroses, donkey-sized monkeys, camphor trees, and dog- or beast-headed beings resembling humans. Here Qazwini recounts a story about Alexander the Great and his men visiting Aturan with their ships (one of which appears at left in the margin), where they recognized the latter creatures as jinn, which were believed to be transparent, shapeshifting bodies. The text continues with descriptions of strange creatures that inhabit the China Sea, including fish and large turtles that may lay a thousand eggs.

RIGHT: *Sea Dragon* (tinnin)

LEFT: *Dolphin* (dulfin)

Manuscript of *The Wonders of Creation and the Rarities of Existence*
Iran, Shiraz, ca. 1440
Ink, opaque watercolor, and gold on paper; leather binding
Courtesy of the University of Manchester, Persian Ms 37, ff. 96b–97a

Illustrations in editions of Qazwini's cosmography produced after his lifetime reveal how artists' depictions of divine creation evolved. In some cases, they appear as abstracted universal forms against a plain background to stimulate contemplation of the relationship between emanated part and divine whole. In others, especially in later illustrations, subjects become rooted in more realistic or vibrant contexts.

These folios from a copy of a Persian translation of the Arabic text present a combination of approaches in the section on aquatic animals. A single dolphin without a background illustrates the entry on this mammal at left. In contrast, the terrifying sea dragon (*tinnin*)—that was cast by an angel from land to sea, then from sea to the distant land of Gog and Magog—is dynamically rendered to occupy more than half the right folio, parts of it pushing through the image's thin, gold frame.

The painting illustrates an account describing the *tinnin* as two leagues in length, leopard-colored, and covered in fish scales with two large fins. Its human-like head was as great as a hill, with large, round eyes, and six serpent-heads sprang from its neck. Encouraging deeper engagement with the page, such visually compelling images further enhanced the reading experience.

Constellations of the Centaur and Lion

Folio from a manuscript of *The Wonders of Creation and the Rarities of Existence*
India, Deccan, ca. 1750
Ink, opaque watercolor, and gold on paper
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.455

The image of the twisted dragon representing the pseudo-planet *Jawzahr* as protection from cosmic disaster became common in the visual culture of Iraq and Anatolia in the fourteenth century. This illustration of the constellation Centaurus from an Indian copy of *Wonders and Rarities* replicates images from a fourteenth-century Anatolian Arabic copy of the text centuries later.

Cuttlefish, Crab, and Skink

Folio from a manuscript of *The Wonders of Creation and the Rarities of Existence*
Yemen, ca. 1640
Ink and opaque watercolor on paper
The San Diego Museum of Art, Gift of Dr. and Mrs. Edwin Binney 3rd, 1972.218

The cosmography's section on water includes aquatic animals with text that describes species' habitats, characteristics, and healing properties. Ashes from the skin of the cuttlefish (*sifiyanus*), said to come from Jerusalem, remove whiteness of the eye in quadrupeds, while crab (*saratan*) can be applied to wounds, and the consumption of skink (*saqanqur*), an aquatic lizard found in the Nile River, increases libido. This folio has been attributed to Yemen based on similarity to other folios associated with a manuscript containing a colophon stating it was completed in Yemen in 1640.

The Early Persian Edition

Qazwini is known to have produced a Persian redaction of *Wonders and Rarities* in 659 AH (1260–61), shortly after the fall of Baghdad and the Abbasid caliphate to the Mongols. The Persian version is distinguished from the Arabic by an additional text exhibiting a broader discussion of human diversity, customs, and craft practices, the latter comprising twenty professions or skills. These additions both informed and entertained readers with knowledge and stories of the past or distant lands and offered them practical applications for human manipulation of the physical world in the present.

RIGHT: *The Cupbearer's Chest*

LEFT: *Throne of Weapons Bearers*

Manuscript of *The Wonders of Creation and the Rarities of Existence*
Ottoman Türkiye, Istanbul or Iran, Tabriz, 974 AH (1566)
Ink, opaque watercolor, and gold on paper; leather binding
The Syndics of Cambridge University Library, MS Nn.3.74, ff. 167v–168r

These folios come from the chapter on carpentry, the general benefit of which is shelter, but which also produces amazing vessels like ships. Qazwini recalls the story of Noah's Ark, which God instructed Noah to build in the form of a bird, and continues to say carpentry is responsible for many implements, such as catapults, invented by the jinn.

These folios depict two other examples of mechanical devices, or automata, described in great detail. One is a cupbearer's chest designed to pour wine into a goblet, depicted at right. The other is a canopied throne surrounded by seated weapons bearers, standing images of whom become revealed to the king when he sits on the throne and his attendant pulls ropes that lower the canopy curtains.

RIGHT: *Demonic Beings* (divs)
LEFT: *The Jinn Appearing before Solomon Enthroned*

Manuscript of *The Wonders of Creation and the Rarities of Existence*
Iran, probably Isfahan, 12 Dhu'l-hijja 1041 AH (June 30, 1632)
Ink, opaque watercolor, and gold on paper; leather binding
Courtesy of the University of Manchester, Persian Ms 3, ff. 219b–220a

These folios come from the cosmography's chapter on jinn included in both the Arabic and Persian editions of Qazwini's text. Among the *gharaʾib*, or rarities, found in the terrestrial realm, Qazwini provides much information about jinn, who are created from fire (Qur'an 55:15) and characterized as transparent shape shifters whose rebellion against God was met with banishment to remote islands of the earth. Qazwini also mentions that some believe jinn were disobedient humans.

On the folio at right appear demonic beings referred to as *divs*. The top image depicts a human-shaped *div* (labeled *al-dilhath*) riding an ostrich, said in the text to eat the flesh of humans lost at sea. The middle image shows a *div* called *al-shiqq*, described as half-human, who appears to people while traveling; here he is shown killing a person who recognizes him and asks for mercy, after which the *div* and human attack each other and both die. The lowermost painting illustrates a story about the *div* known as *al-muzhib*, who serves ascetics and "tries to make them conceited." These accounts are followed by a chapter on strange stories about the jinn, in which Qazwini discusses the jinns' connection to the Prophet Sulayman, the biblical King Solomon, who ruled over them.

The folio at left references a frequently illustrated story of Solomon asking the jinn why they appeared in diverse forms despite descending from the same father, to which the jinn replied that their appearance derived from their different sins. Here Solomon appears enthroned, surrounded by his advisors and jinn.

WONDERS AND RARITIES

The Arabic phrase *ʿajaʾib wa gharaʾib*—from which derives the abbreviated title of Qazwini's cosmography, *Wonders and Rarities*—refers to two distinct yet closely related concepts. While wonders (*ʿajaʾib*) are defined more broadly by the perplexity they elicit due to one's lack of knowledge, rarities (*gharaʾib*) indicate extraordinary phenomena that are seldom seen or encountered, such as shooting stars and strange creatures. From Qazwini's perspective, wonders may include rarities as well as ordinary or commonly encountered phenomena, the contemplation of which leads to greater knowledge about them. The works displayed here celebrate the *gharaʾib*—the strange, foreign, and extraordinary—in and beyond Qazwini's text.

Muhammad Husayn (publisher)

Winged People of the Island of Zabaj

Page from a lithograph copy of *The Wonders of Creation and the Rarities of Existence*
Iran, Tehran, 1866
Ink and watercolor on paper; lithograph with hand painting
Museum of Fine Arts, Boston, Gift of Patricia Pratt
in honor of John Goelet, 2019.2218

Qazwini's elaborate descriptions of wonders inspired artists to expand their visualizations of the text into full-page renderings combining several encyclopedic entries in a shared setting or to alter some of those descriptions in their interpretations. This lithograph-printed folio from Qajar Iran comes from the end of *Wonders and Rarities* in a discussion focused on animals "with strange forms and shapes." It depicts some of the inhabitants of the island of Zabaj, which include human-like creatures who climb trees or fly, oxen-sized white-and-black monkeys, gazelle-tailed mountain goats, green peacocks, bat-winged cats, muskrats, red-and-yellow parrots that speak all languages, and *huwara* birds with black wings and white bellies. Here the artist depicts only the human-like creatures, parrots, and a peacock.

Hayv Kahraman (Kurdish Iraqi and Swedish, b. 1981)

Ghuraba

2024
Acrylic and oil on flax fibers
The San Diego Museum of Art, Museum Commission, 2024.27

The strange and hybrid creatures inhabiting the peripheries of Qazwini's universe move to the foreground in Hayv Kahraman's multilayered portrait of *ghuraba'* (strangers or foreigners), which pays homage to *Wonders and Rarities* in both execution and content.

From its substrate, a marbled surface composed of several square units woven from flax fibers, to its central composite "stranger" made of different plant and animal parts, the work references Qazwini as well as the artist's life experiences. *Ghuraba* explores science, craft, and stories about creation, loss, immigration, othering, and the impact of human actions within an interconnected cosmos. The title puts a twist on Qazwini's *gharaʾib*, a word that stems from the same Arabic root. *Gharaʾib* refers to rarities in a wider sense, while *ghuraba'* implies people, alluding to Kahraman's humanizing perspective on the last beings described within the hierarchy of divine creation.

King Anushirvan and Two Attendants Looking At a Creature from the Caspian (Khazar) *Sea*

Manuscript of *The Wonders of Creation and the Rarities of Existence*
India, Deccan, ca. 1650–1700
Ink, opaque watercolor, and gold on paper; modern leather binding
Harvard Art Museums/Arthur M. Sackler Museum, Gift of Philip Hofer in memory of Eric Schroeder, 1972.3, ff. 100v–101r

Although the conclusion to Qazwini's cosmography, which comes at the end of the animal kingdom, devotes a section to "animals with strange forms and shapes," many such rarities (*gharaʾib*) appear throughout the text. These folios from a Deccani manuscript come from the chapter on the islands and creatures of the Caspian (*Khazar*) Sea, where Qazwini recounts a "strange story" about a creature who appears before the Sasanian king of Iran, Khusraw I (r. 531–79), known as Anushirvan. After Anushirvan reinforces a fallen dam built by Alexander the Great, a strange beast comes to the ruler, who asks his protective courtiers to lower their weapons. Identifying himself as an inhabitant of the Caspian Sea, the creature tells Anushirvan that God said a ruler like him would successfully rebuild the dam, and asks God to reward Anushirvan. Here the beast appears before the king and two courtiers as a dark, spotted quadruped with horns and a tail that ends in a dragon-like head.

RIGHT: *Feline Creature with a Lion's Head and Jaguar's Face*

LEFT: *Creature Resembling a Horse with a Serpentine Tail*

Manuscript of the *Tarjama-yi tarikh-i yangi dunya*
(Translation of the history of the New World)
India or Iran, 1805
Ink, opaque watercolor, and gold on paper; lacquered
binding (ink on papier-mâché under
a lacquered varnish)
Harvard Art Museums/Arthur M. Sackler Museum, The Edwin Binney 3rd
Collection of Turkish Art at the Harvard Art Museums, 1985.270, ff. 85v–86r

The *Hadis-i nev* (New report, 1583), an Ottoman history of the New World composed by the courtier Mehmed ibn Ḥasan Suʾudi (d. 1591) for Sultan Murad III (r. 1574–95), belongs to a wider corpus of wonders literature that reflects the influence of *Wonders and Rarities.* These folios from a Persian edition of the text describe some of the *gharaʾib* to be found in the new world in terms of strange creatures: a feline with the head of a lion and face of a jaguar or leopard (*palang*) and a dog-sized quadruped creature resembling a horse with a long, serpent- or snake-like tail.

SUPERLUNARIES: THE CELESTIAL REALM

Then look at the stars, the Sun, and the Moon and see how they differ in their rising and setting points to produce various times that are causes for the generation of animals and plants....There is no way to count a tenth of a tenth of the wonders of the skies.
—Zakariyya ibn Muhammad al-Qazwini

In *Wonders and Rarities*, Qazwini first addresses superlunaries (*al-awliyat*), which encompasses the celestial realm containing everything above the moon. Qazwini guides the reader through the nine revolving celestial spheres (*aflak*): the moon, Mercury, Venus, the sun, Mars, Jupiter, Saturn, the fixed stars (containing the zodiac and constellations), and the *falak al-aflak*, or sphere of spheres, which sets the universe in motion. Qazwini describes how these celestial forces influence life on earth and how their powers are harnessed with the aid of human crafts like talismans, magic, or medicine.

When Qazwini was writing his cosmography, astronomy and astrology, the study of the movement and power of the stars to create wondrous effects, constituted a broader field known as *ʿilm al-falak* (the science of the celestial sphere) or *ʿilm al-nujum* (the science of the stars). Qazwini grounded his information on these sciences in established writings translated from Greek, Syriac, Persian, and Sanskrit into Arabic under the Abbasid caliphate between the eighth and tenth centuries.

This section of the exhibition explores the theoretical and practical transmission of knowledge of the heavens, highlighting some of the tools facilitating their study and the makers who crafted them.

THE DIVINE

As an Islamic text, *Wonders and Rarities* presents a hierarchical description of the universe that begins with God, the Creator of all existence. Although the cosmography does not include a section under this heading, the works displayed here introduce the celestial realm by representing God and Islam through the Qur'an (literally, "The Recitation"), the holy book believed by Muslims to contain God's revelations to the Prophet Muhammad. This section also evokes the divine through other material culture bearing Qur'anic prayers or the names of God, the Prophet Muhammad, or the Prophet's family. Through the power of the letters either representing God's word or divine names, many of the objects carry talismanic value, allowing them to be used for beneficial purposes like healing and protection.

The Qur'an

Islam is based on the teachings of the Qur'an (literally, "The Recitation"), a text believed to contain God's words as revealed to the Prophet Muhammad beginning in 610. The Qur'an contains a series of short narratives on broad themes as well as instructions and admonitions to the reader. Its teachings are supplemented by the sunna, which comprises the manners, deeds, and sayings of the Prophet, compiled after Muhammad's death by his followers in oral traditions (hadith) attributed to him.

RIGHT: *Surat al-Fatiha* (The Opening, 1:1–7) and *Surat al-Baqara* (The Cow, 2:1–6)

LEFT: *Surat al-Nisa* (The Women, 4:164–73)

Partial Qur'an manuscript with binding
West Africa (possibly Nigeria), 18th–19th century
Ink and color on paper; leather binding
Harvard Art Museums/Arthur M. Sackler Museum, Gift of Philip Hofer, 1984.413, ff. 1v–2r; 1984.413.X.1 (binding)

This Qur'an of stacked, unbound folios is held together by an embossed leather wrap binding for access and portability. Some folios may have been lost or placed out of order over time, as the first two folios, displayed here, are not sequential. The folio at right includes the Qur'an's opening chapter (sura) and the first few verses of the following one, while the one at left continues the fourth chapter from the end of verse 164.

The bold, round letters appearing on the folios recall the *barnawi* script commonly used in Nigeria. Geometric grid designs like one on the right folio represent another element associated with West African bookmaking. Inserted as dividers between chapters and sections, they are both decorative and functional and are imbued with talismanic associations.

Surat al-Mujadila (The Pleading/Arguing, 58:1)

Manuscript containing a *juz'* (part) of the Qur'an
China, 18th century
Ink, opaque watercolor, and gold on paper; leather binding
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 289 MS, ff. 1v–2r

Although Islam reached China as early as the eighth century, the opening of trade routes between East and West Asia under the Mongols contributed to the spread of Islam and cultural exchange between these regions. Qur'ans were often produced in thirty-volume sets, each part known as a *juz'*. The *muhaqqaq* script here represents a Chinese variation with gilded letters and geometric and floral designs outlined in black and embellished with blue-and-red dots and lines.

Surat al-Kahf (The Cave, 18:75–76)

Manuscript containing a *juz'* (part) of the Qur'an
Iran, late 13th century–early 14th century
Ink, opaque watercolor, and gold on paper; leather binding
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 44 MS, ff. 2v–3r

These richly illuminated folios highlight verses recounting the travels of the Prophet Moses with a man of knowledge. Penned in an elegant *muhaqqaq* script, the text is framed by a gilded border against a background of foliated scrolls. A gold medallion marks one verse's end and the beginning of the next. Letters in the margin of the left folio complete a word at the right interrupted by the gilded frame. Such elements not only embellished the Qur'an but also aided recitation.

Processional standard (*ʿalam*)

India, Deccan, probably Hyderabad, late 17th–early 18th century
Brass
The Metropolitan Museum of Art, Purchase, Friends of Islamic Art Gifts, 2013.37

The *ʿalam* is a standard carried in religious processions within the Shiʿa branch of Islam, particularly those commemorating the martyrdom of the Prophet's grandson Husayn on 10 Muharram 61 AH (October 13, 680). At the Golconda court in the Deccan, *ʿalam*s were incorporated into Muharram rituals observed by both Muslims and Hindus. This example contains a central inscription with the names Allah (God), Muhammad, and Ali (the Prophet's son-in-law) repeated in roundels encircling the pierced center. Other talismanic elements add further protection.

The double-bifurcated extensions flanking the shaft reference the sword of Ali, known as *Dhu'l-faqar*. A pair of dragons knotted at the tails recall ones appearing on objects and architecture throughout the Persianate world, where they were associated with fear and tyranny. Such dragons were also linked to the pseudo-planet *al-Jawzahr*, an "eclipse dragon" that threatened the sun and moon as the dual form of lunar and solar eclipses. *Al-Jawzahr* could either devour light by swallowing the moon or deliver it by giving birth to the sun.

Keris (dagger) of Sultan Abdul Jalil and sheath

Malaysia/Indonesia, Johor-Riau Sultanate, 1124 AH (1712)
Iron, silver, wood
Islamic Arts Museum Malaysia, 1998.1.3929

Originating in Java, the *keris* is a ceremonial dagger valued as an ancestral weapon and spiritual object throughout Southeast Asia by Muslims and non-Muslims alike. The blade of this example is inscribed with a talismanic square and the Qur'anic verse, "God is truly with those who are patient" (2:153). The design on the blade is a diagram (*wafq*) with the letters *lam-alif* (لا) at center and the Arabic number 8 (٨) on each side. The *Pata tiga* form carved at the hilt is a variation of the anthropomorphic figure known as *Jawa demam* (feverish Javanese).

Magic-medicinal bowl with image of the Kaʿba

India, possibly 14th–15th century
Bronze; engraved and inlaid with silver
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 945 M

Islamic magic-medicinal bowls, produced since at least the twelfth century, were often engraved with religious texts and divine imagery to harness celestial forces to heal and protect their users from illness and misfortune. They could be filled with liquid believed to absorb the protective powers invoked by their inscriptions. The liquid could then be ingested or sprinkled for the desired wondrous effect.

An image of the Kaʿba, a sacred, cube-shaped structure in the Great Mosque of Mecca, and an inscription suggest Mecca as the place of production, but the bowl was probably engraved in Mecca rather than fabricated there.

Talismanic shirt

India, probably 15th century
Ink and colors on cotton
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 114 T

The surface of this talismanic shirt includes all 114 chapters of the Qur'an, written in a compressed, miniature script known as *ghubari* ("dust-like"). Blue medallions on each side contain the *shahada*, or Islamic profession of faith. The ninety-nine names of God border the verses and another from *Surat Yusuf* (Joseph, 12:64) praises God as the ultimate Protector.

Mughal Indian, Ottoman Turkish, Safavid Persian, and West African examples of similar shirts survive from at least the fifteenth century. Magical and medical literature of the period does not mention them, so their function may only be surmised from other accounts that refer to them and their inscribed texts. The surviving tunics are often covered with Qur'anic verses, prayers, the names of God, magic squares, or amuletic motifs. They may have been worn or folded and carried for protection in battle, to ward off disease, or even during childbirth or for political aims.

An Airborne Angel with a Rosary

Single-page painting mounted on a detached album folio
Afghanistan, Herat, ca. 1500
Ink, opaque watercolor, and gold on paper
The San Diego Museum of Art, Gift of Edwin Binney 3rd, 1971.59

Qazwini describes angels as the inhabitants of the heavens and "craftsmen of the interior." As intermediary beings, angels resemble demons and jinn but differ from them in their commitment to do God's work. They are presented in order of importance in the cosmography. Surviving folios from a fourteenth-century copy made in Iran depict angels recognized also in Judeo-Christian tradition, such as Israfil (Raphael) or Jibril (Gabriel).

Angels became a popular motif for single-page painting in the Persianate world, particularly in the sixteenth and seventeenth centuries. This example features a seated angel with a rosary in hand and suspended, appropriately, in the heavens among Chinese-inspired clouds.

ASTRONOMY

Astronomy (*ʿilm al-haya*, the science of celestial appearances) features significantly in the cosmography. Qazwini cites Greek scholars like Ptolemy (d. ca. 170) in discussions of planetary motion and the constellations. He also draws from the widely circulated *Kitab Suwar al-kawakib al-thabita* (The book of diagrams of the fixed stars) by ʿAbd al-Rahman al-Sufi (d. 986), which compares the Greek constellations and stars in Ptolemy's *Almagest* with Arabic ones, illustrating all of the constellations with views from both the heavens and the earth.

Qazwini's accumulation of knowledge from different traditions reflects the development of mathematical sciences and astronomy in the medieval Islamic world. Astronomy progressed in both theory and practice. Cosmographical theories about planetary motions used advanced calculations achieved through large-scale observatories. Instruments such as the astrolabe, invented in ancient Greece, were further refined to improve practical knowledge of timekeeping.

Muhammad Baqir al-Hafiz (calligrapher)

Hasan ibn Sa'd al-Qa'ini (translator)

Abu'l-Fath Manuchihr Khan (r. 1624–64) (patron)

Leo (Asad), *as Seen in the Heavens*

Folios from the *Tarjumah-i Suwar al-kawakib* (Translation of the book of diagrams of the fixed stars) of al-Sufi (d. 986)
Iran, possibly Mashhad, 1630–33
Ink, opaque watercolor, and gold on paper; stamped, tooled, and gilded leather binding
The New York Public Library, Astor, Lenox and Tilden Foundations, Spencer Collection, Persian MS. 6, ff. 99v–100v

One of the most significant astronomical contributions of the Islamic world was ʿAbd al-Rahman al-Sufi's *Kitab Suwar al-kawakib*, which compared Ptolemy's classical constellations and stars to Arabic ones, provided the names and positions of 1025 stars, and depicted the constellations from two perspectives, as viewed in the sky and on a celestial globe. The text became a reference book for observatories and globe makers in both the Islamic world and Europe. This illustration from a copy of a Persian translation depicts the constellation Leo as seen in the sky.

Abu'l Hasan Sufi (illustrator)

Constellation of the Dragon (al-tinnin)

Manuscript of the *Mirat al-nujum* (Mirror of astronomy)
India, Surat, 1740
Ink, opaque watercolor, and gold on paper; leather binding
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.1013, ff. 16v–17r

Commissioned by Nawab Tegh Beg Khan, the *Mirat al-nujum* is an astronomical treatise written in Persian and illustrating constellations with mirror-image perspectives that follow the model of al-Sufi's *Kitab Suwar al-kawakib* (The book of diagrams of the fixed stars). This copy was produced in the western port city of Surat, home to many Arabs and Iranians who came to India to engage in maritime trade across the Indian Ocean.

A Magician Conjures the Spirits

Folio from a manuscript of the *Nujum al-ʿulum* (Stars of the sciences)
India, Bijapur, 14 Rabiʿ al-awwal 978 AH (August 26, 1560)
Ink, opaque watercolor, and gold on paper
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.435

Astrology, talismans, and spells were appreciated as keys to understanding how nature worked by leading religious authorities during Qazwini's lifetime as well as in the pre-modern period. This folio from a manuscript of the *Nujum al-ʿulum* was completed for the sultan of Bijapur, Ali ʿAdil Shah II (r. 1656–72). Written in Persian, the text is an encyclopedic compendium blending cosmological narratives from Islamic and Hindu traditions to address several disciplines, in particular astrology and astral magic. Its nearly four hundred illustrations, charts, and diagrams depict constellations, planets, angels, talismans, and other celestial and terrestrial influences. This folio illustrates instructions on how to control demons and angels through incantations using the *mandal*. Derived from the Sanskrit *mandala*, the mandal is a circular area in which a practitioner chants a mantra or sacred formula next to a sacred fire used to fumigate incense or medicine in order to harness wondrous effects.

Astronomy and Timekeeping: The Astrolabe

Conceived to imitate the apparent motion of the sky as seen from the earth, the astrolabe is a scientific instrument used to determine time. In the ninth and tenth centuries, the study of timekeeping expanded into a comprehensive branch of astronomy alongside the development of mathematical sciences in the Islamic world. Knowledge of astrolabe making arrived from ancient Greece through Arabic translations of earlier sources. Timekeeping came to encompass everything related to time, directions, and the production and use of instruments, in particular portable astronomical instruments like the astrolabe.

Quadrant

Türkiye, 1277 AH (1860–61)
Wood, bronze
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 25 W

Developed as a simplified alternative to the astrolabe, the quadrant (*rubʿ al-daʾira*, quarter of a circle) could be used for nearly all the same applications addressing a single latitude. This example displays a projection calculated and drawn for latitude forty-one degrees north (Istanbul) and shows attention to decorative embellishments in addition to precision drawing.

Quadrants replaced astrolabes for timekeeping from the thirteenth to nineteenth century in the Mamluk and Ottoman realms. Easy to use with a brief instruction manual, they enabled greater public access to scientific knowledge and timekeeping.

Manuscript of the *Sharh al-mulakhas fi ʿilm al-haya* (Commentary on the *Epitome on Astronomy*)

Ottoman Türkiye or provinces, 1650–1700
Ink on paper; leather binding
Islamic Arts Museum Malaysia, 2011.7.52, ff. 6b–7a

This extensive commentary on the *Epitome on Astronomy* by the thirteenth-century astronomer al-Jaghmini was compiled by Qadizadeh al-Rumi (d. after 1440), one of the leading astronomers of the fifteenth century. Both the original work and the commentary address the nature of the heavens and the motion of the sun, moon, planets, and stars, conjunctions between these bodies, eclipses, and the earth's geography. Among the most copied astronomical treatises in Islamic history, they represent the essence of cosmographical concepts established by Ptolemy and would have been studied by any student of astronomy.

Signed by Mufaddal ibn Haydar and Masʿud ibn Asʿad

Parts of the Astrolabe

Manuscript of a compendium of astronomy and
astrology by Abu Maʿshar al-Balkhi
Iran, Shiraz, 747–48 AH (1347)
Ink on paper; leather binding
Islamic Arts Museum Malaysia, 2017.1.12, ff. 16b–17a

The author of this compendium of astronomy and astrology, Abu Maʿshar al-Balkhi (d. 886), was one of the most influential astrologers of the Abbasid court. He gained prominence after predicting the release from prison and subsequent reign of the caliph al-Muʿtazz (r. 866–69). Although Abu Maʿshar was known to have been trained in astronomy, his contributions to this field are mainly deduced from his astrological writings.

Manuscript containing treatises on theory, construction, and uses of the astrolabe

Türkiye, Sivas, 1231–38
Ink and watercolor on paper; leather binding
The al-Sabah Collection, Dar al-Athar al-Islamiyyah,
Kuwait, LNS 67 MS, ff. 68v–69r

Signed by Muhammad Mahdi al-Yazdi

Astrolabe

Iran, ca. 1660
Brass
Islamic Arts Museum Malaysia, 2017.5.4

Signed by Muhammad Mahdi al-Yazdi

Horizontal dial and qibla indicator

Iran, 1650–1700
Brass
Islamic Arts Museum Malaysia, 2019.16.19

This astrolabe and the combined sundial and qibla indicator (*qiblanuma*) were made and signed by the Persian craftsman Muhammad Mahdi al-Yazdi, arguably the greatest astrolabe maker of the Islamic world. Like the quadrant nearby, the qibla indicator was another ingenious, easy-to-use alternative to the astrolabe for determining the direction of prayer toward Mecca.

The names of dozens of locations, mostly Iranian cities, as well as their qibla angles in degrees and minutes, can be read on the borders of this example. Appearing within this border of names are the inclined lines of a sundial with a retractable gnomon (a small vertical rod that casts shadow on the surface of the instrument) and a compass above. The user can find the cardinal directions using the compass, then determine the qibla angle, and, at last, read the time of prayer on the sundial. The small size of both instruments made them ideal for travel.

The Astrolabe's Functions

Islamic religious rituals, such as prayer at specific times of day and fasting during Ramadan, a month in the lunar Islamic calendar, require careful observations and calculations of time. In the medieval Islamic world, these practices incentivized the evolution of the astrolabe into a complex instrument with over a hundred applications. Beyond timekeeping, the astrolabe was also used to indicate the qibla, or direction of Mecca for prayer, calculate trigonometric equations, and measure the length of tall structures. Over time, the astrolabe developed not only as a practical instrument, but as a work of art and fine craftsmanship. Embellished with ornate decoration, many astrolabes were signed by makers who were veritable intellectual polymaths, simultaneously wearing the hats of astronomer, mathematician, poet, and courtier.

Seated Figure Using an Astrolabe, detail of a folio from a manuscript of *The Wonders of Creation and the Rarities of Existence*. Iran, probably Isfahan, 12 Dhu'l-hijja 1041 AH (June 30, 1632). Ink, opaque watercolor, and gold on paper; leather binding. Courtesy of the University of Manchester, Persian Ms 3, f. 207b.

ʿUmar ibn Yusuf ibn ʿUmar ibn ʿAli ibn Rasul al-Muzaffari

Astrolabe

Yemen, 690 AH (1291)
Brass; cast and hammered, pierced, chased, and inlaid with silver
The Metropolitan Museum of Art, Edward C. Moore Collection,
Bequest of Edward C. Moore, 1891, 91.1.535a–e

This remarkably documented astrolabe bears an inscription attributing it to the Rasulid prince ʿUmar ibn Yusuf a few years before he ascended to the throne under the regnal name al-Ashraf (r. 1295–96). He may have produced it in collaboration with an unidentified metalworker. Among the many scientific treatises known to have been compiled by ʿUmar, one contains instructions on how to make astrolabes as well as other instruments, and includes a description of an astrolabe resembling the present example.

Qiblanuma compass

Iran, 18th–19th century
Brass; engraved and spun
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 70 M

Representing another type of qibla indicator, this circular box contains gazetteers, or geographical indexes, on both sides. These, in turn, are inscribed with nested circular lists providing names of several localities along with their respective angles and qibla directions.

Parts of the Astrolabe

An astrolabe comprises at least four parts. The *mater*, or base plate, includes a rim with a 360-degree scale, which represents twenty-four hours in degrees. The *plate* is a circular disk fastened to the mater; it represents the projection of the sky drawn for a specific latitude on Earth. The *rete* is a rotatable hollowed disk placed over the plate, which contains the circular band of the zodiac, the annual motion of the sun, and pointers indicating the positions of stars in relation to the sun. One full rotation of the rete represents a twenty-four-hour day. The *alidade* is a rotatable arm attached to the center of the astrolabe's back; used with a ninety-degree scale on the back of the mater, it can measure the altitude of a celestial body. Additional parts include the *throne*, located at the top of the astrolabe, and the *horse*, the component placed over the rete and through the holes of the parts to hold the astrolabe together.

Taha Yasin Arslan (Turkish, b. 1984)

Replica of a 17th-century astrolabe signed by Qassim Ali Qaʾini

2024
Original made in Iran, 1093 AH (1682); housed in the History of Science Museum, Oxford
Brass

Apart from its contemporary maker's signature, this astrolabe is a replica of one made by Qassim Ali Qaʾini. The rete incorporates a scrolling vegetal design topped by a *khamsa* (also called *hamsa* or hand of Fatima), symbol of the *basmala*, or invocation to God. A sitting bird inside an escutcheon-shaped frame within the *khamsa* points to Vega, the brightest star in the northern constellation of Lyra. The elaborate decoration of the rete's strapwork emphasizes the artistic mastery achieved in the production of these instruments between the sixteenth and eighteenth centuries in Safavid Iran and Mughal India.

Signed by Diyaʾ al-Din ibn Muhammad Qaʾim

Planispheric astrolabe

Pakistan (Mughal India), Lahore, 1068 AH (1657)
Brass
Islamic Arts Museum Malaysia, 2021.4.60

This astrolabe represents the master craftsmanship of scientific instrument makers in seventeenth-century Lahore; it has been disassembled to display each of its components more clearly. Five plates are inscribed on both sides, with four intended for eight different latitudes. One contains additional markings set for Lahore, designed for use with a special horizon line resembling the form of a ship at the center of the rete.

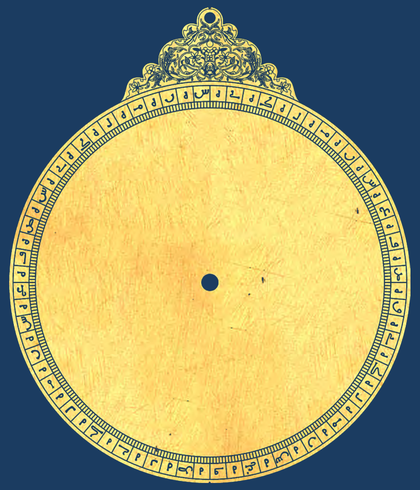
The back of the mater bears the date and signature of its maker, Diyaʾ al-Din, followed by his genealogical connection to a distinguished line of astrolabe makers, including a great-grandfather who served as court astronomer to the Mughal emperor Humayun (r. 1530–40, 1555–56).

THE ASTROLABE: A TIMEKEEPER'S MARVEL

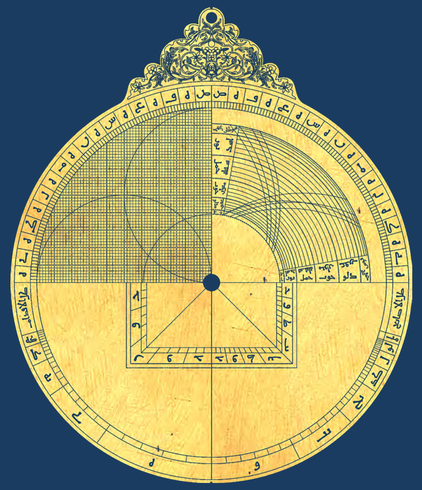
Astrolabes are tools that use the position of the stars in the sky to tell time as well as to perform other functions.

This a slightly enlarged brass reproduction of an astrolabe made in Iran in 1682. An exact replica appears in the enclosed case.

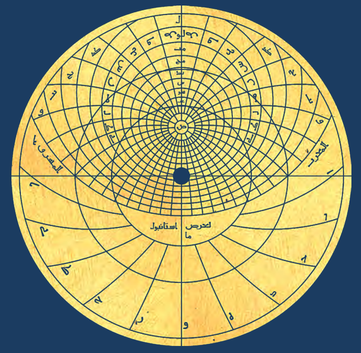
- Feel the weight of the object and see which parts you can turn.
- Can you locate the different parts of the astrolabe shown in the pictures below?
- What tools do you use to tell time and to observe the stars?



MATER (FRONT)



MATER (BACK)



LATITUDE PLATE

RETE

HORSE

ALIDADE

To learn how to calculate time with an Islamic astrolabe, watch an excerpt from a PBS *NOVA* documentary featuring Dr. Taha Yasin Arslan. Scan this QR code.

ASTROLOGY

Astrology (*ʿilm ahkam al-nujum*, the science of the judgment of the stars) addresses how movements of celestial bodies influence the terrestrial realm. In the medieval Islamic world, astrology formed part of the wider field of natural philosophy, the study of the nature of the material and celestial worlds. The physician and philosopher Ibn Sina (also known as Avicenna, d. 1037) considered astrology a natural science, along with medicine.

The practice of astrology requires an understanding of the location and configurations of stars in order to harness celestial powers for the production of wondrous effects, such as identifying auspicious moments for events or predicting the course of a person's life according to their date and time of birth.

Cancer and Leo

Folio from an unidentified manuscript
India, ca. 1590
Ink, opaque watercolor, and silver on paper
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.451

Bifolio from an almanac attributed to Ali al-Shirvani

Attributed to Afghanistan, Samangan, 18 Dhu'l-Hijjah 615 AH (March 12, 1219)
Ink, watercolor, and gold on paper
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 270 MS, ff. 5v–6r

A large part of the astrologer's job was to quantify celestial movements as seen in almanacs (known as *ruznama*), such as this illustrated example. Almanacs provided a calendar of the days, weeks, and months of the year, along with other astronomical data collected for various objectives, including navigation, weather predictions, and planting and harvesting schedules.

Horoscope chart for a newborn child

Bifolio from an unidentified astrological text
East Iranian world, probably Khurasan, early 12th century
Ink, opaque watercolor, and gold on paper
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 275 MS (a)

Natal astrology, or genethlialogy, was used to predict the course of an individual's life based on birth details, such as date, time, and location. Astrologers would use this information to create a natal chart recording positions of the sun, moon, planets, and other celestial bodies relative to the zodiac at the moment of birth.

Surya Surrounded by Signs of the Zodiac

India, ca. 1830
Ink, opaque watercolor, and gold on paper
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.1312

Translations from Sanskrit into Arabic and Persian brought Indic astrological knowledge into the Islamic world. In India, Hindu and Muslim artists often worked together and traveled between court workshops. This painting and the adjacent drawing depict the Hindu sun god Surya, who also represents the Sun itself, surrounded by oval medallions containing the signs of the zodiac.

Surya Surrounded by Signs of the Zodiac

India, ca. 1720
Ink on paper
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.1183

This drawing depicts the Hindu sun god Surya surrounded by circular medallions containing the signs of the zodiac labeled in the Indic script known as Devanagari. It may be an underdrawing for a painting that was never completed or it could have served as a model for paintings akin to the adjacent one of Surya and the zodiac.

Star map depicting the northern and southern celestial hemispheres (with constellations inscribed in Devanagari)

India, Jaipur, ca. 1780
Ink, opaque watercolor, and gold on paper
Pritzker Collection, Chicago

Islamic astrological sciences reflect centuries of intellectual exchange with Indic, Sasanian (ancient Iranian), and Greek astral cultures. Differing and sometimes contradictory cultural and religious systems are thus recognizable in Islamic astrology. This map incorporates Indic, Greek, and Islamic astrology and is distinguished by the unusual superimposition of the twenty-seven lunar mansions (nakshatras) in Hindu astrology placed over depictions of the zodiac and constellations (split between the two hemispheres) from classical (Greek/Islamic) astrology. Inscriptions in Devanagari script identify both the nakshatras and constellations.

The printed star map recalls Albrecht Dürer's woodcut star maps produced in Germany in 1515. Jesuit missionaries introduced such European prints along with Christianity to Mughal India, thereby contributing to a convergence of Christian European, Perso-Islamic, and Indigenous artistic traditions in India.

This work has been associated on stylistic grounds to the end of the eighteenth century, following the reign of Maharaja Sawai Jai Singh II (r. 1699–1743), who initially served as a vassal to the Mughal emperor Aurangzeb (r. 1658–1707). He is remembered as a great patron of astronomy who commissioned several astronomical manuscripts and built five large observatories throughout India, including in Jaipur.

Half-mold for a jug with zodiac symbols and blessings in Arabic

East Iranian world, 12th–13th century
Earthenware; molded and unglazed
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 261 C

This object decorated with personifications of the zodiac is one half of a master mold used to make "copy molds." The latter were created in two parts by laying earthenware over the master mold to capture an impression of its design in negative. The stonepaste used to produce such molded wares was a stiff paste that could be rolled out like a sheet of pastry and pressed into the copy mold with the craftsperson's fingers.

Cast impression of the half-mold. Courtesy of the al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait.

Chihil kilid (forty keys) divination or magic bowl with inscriptions, zodiac signs, and plaquettes

Iran, 1090 AH (1679)
Copper alloy (brass); engraved with repoussé center
and inlaid with black composites
Brooklyn Museum, Gift of Mrs. Charles K. Wilkinson
in memory of her husband, 1989.149.11

Islamic magic bowls are distinguished from their pre-Islamic Aramaic counterparts by medium, produced mainly in metal instead of clay and lacking inscriptions invoking demons. Unlike other Islamic magical artifacts, like amulets, they were not worn or carried and were only used when needed. Examples from the twelfth to fourteenth century included inscriptions describing their medicinal uses.

This example bearing a date and a blessing to an unnamed owner on the bottom is covered with inscriptions pointing to Shiʿa themes, some of which alternate with depictions of zodiac signs along a border below the rim. The appearance of astrological iconography on magic bowls and amulets dates at least to the thirteenth century. Two of the bowl's four plaquettes—what remains of the symbolic "keys" meant to help its owner seek healing and protection—appear to be composed of Chinese mirror fragments, which alludes to the history of cross-cultural transmission between Iran and East Asia.

Cassiopeia (Dhat al-kursi)

Folio from a manuscript of the *Kitab Suwar al-kawakib* (Book of diagrams of the fixed stars) by al-Sufi (d. 986)
India, 17th century
Ink, opaque watercolor, and gold on paper
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.456

Al-Sufi's compendium of diagrams of the stars includes the thirty-six constellations of the two hemispheres as well as the twelve constellations of the zodiac. This folio from a seventeenth-century Indian copy of his text depicts Cassiopeia (*Dhat al-kursi*), a constellation of the northern hemisphere named after the Ethiopian queen and mother of Andromeda in Greek mythology and described as a "woman on a throne." The image above her may represent the constellation Aquila.

SUBLUNARIES: THE TERRESTRIAL REALM

There are enough wonders beneath the celestial sphere—like the orb of the earth with its breadth and depth, its rooted mountains and rolling rivers, and its minerals and trees, each with its properties and purposes—to boggle the senses and baffle the mind.
—Zakariyya ibn Muhammad al-Qazwini

The terrestrial realm contains the elements of fire, air, water, and earth, which form the basis of all created things. These, in turn, generate or become transformed into one another to produce increasingly complex beings. Qazwini identifies these sublunar marvels in order of their proximity to the elements in their simplest state, classifying them according to their positions in the mineral, plant, and animal kingdoms.

In addition to citing prominent Greek sources such as Dioscorides's *De materia medica* (ca. 50–70) or Ptolemy's *Almagest* (2nd century), Qazwini weaves in Qur'anic references and entertaining anecdotes, such as accounts of the Macedonian king Alexander the Great (r. 336–323 BCE), who was known for his legendary thirst for knowledge and discovery. As humans navigated the terrestrial realm, they created tools and artworks that engaged with and were transformed by an array of sciences, such as cartography, geography, mineralogy, biology, and alchemy.

The works in this section of the exhibition represent some of the diverse geographies and species of the natural world that have fascinated humanity for centuries. They also reveal some of the extraordinary ways in which people have used the skill and intellect of their own hands to transform terrestrial matter into marvels of creation.

Alexander Questions the Philosopher, the Physician, and the Goblet

Folio possibly from a manuscript of the *Khamseh* (Quintet) of Nizami
Mughal India, ca. 1610
Ink, opaque watercolor, and gold on paper
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.328

Stories about the travels of the Macedonian king Alexander the Great (r. 336–323 BCE) and his obsession with uncovering marvels abound in literary traditions from ancient Greece to Iran, India, Türkiye, and Malaysia. This painting references an unusual encounter with the Indian king Kayd recounted in the works by two popular poets of the Mughal court, Nizami (d. 1209) and Amir Khusraw Dihlavi (d. 1325). Learning that Kayd alone possesses four wondrous things—a beautiful daughter, his court physician, his court philosopher, and a cup that remains eternally full by attracting moisture from the "turning heavens"—Alexander seeks and ultimately obtains them from the king.

Alexander at the Wall of Gog and Magog

Folio from a manuscript of the *Shahnameh* (Book of kings) of Ferdowsi
Mughal India, ca. 1600
Ink, opaque watercolor, and gold on paper
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.313.1

This folio from a manuscript of the *Shahnameh*, a Persian epic, recounts one of Alexander the Great's marvelous deeds also familiar in Hebrew, Christian, and Islamic traditions. In his travels, Alexander reached a mountain pass where he found a people suffering from corruption spread by the purportedly uncivilized, monstrous beings called Gog and Magog, known as Yaʾjuj and Maʾjuj in the Qur'an (Yajuj and Majuj in Persian). Persuaded by the people's pleas to build a fortified barrier, Alexander filled the gap between the two mountains with blocks of iron and poured molten copper over it so that Gog and Magog could neither scale nor tunnel through.

A traveler's talismanic compendium

Ottoman Türkiye, 1199 AH (1785–86)
Ink on paper; papier-mâché case
Islamic Arts Museum Malaysia, 2018.5.18

This portable object contains names, diagrams, and imagery of religious and talismanic value. The grid on the left features the Prophet Muhammad's many epithets, while the one on the right lists the ninety-nine names or attributes of God. As the paper unfolds further, the compendium reveals depictions of the Aqsa Mosque, the Great Mosque of Mecca, and the Prophet's Mosque in Medina.

Port of Dubrovnik

Manuscript of the *Kitab-i Bahriyeh* (Book of navigation) of Piri Reis
Ottoman Türkiye, 14 Muharram 1100 AH (November 8, 1688)
Ink and opaque watercolor on paper; leather binding
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 75 MS, 78v–79r

This atlas by Ahmed Muhiddin Piri, or Piri Reis (d. 1553/4), contains portolans, or nautical charts, to help sailors navigate the Mediterranean Sea; it is opened to a folio representing the port of Dubrovnik, as indicated by the Ottoman Turkish caption in red, *iskele-i Dubrevenik* (dock of Dubrovnik).

Piri Reis was a famed navigator, mapmaker, and corsair who traveled along the coasts of Tunisia, Algeria, Spain, France, and Italy, learning multiple languages and eventually becoming an Ottoman naval officer. Completed in 1521 and revised in 1526 as a gift for Sultan Süleyman I (r. 1520–66), the text's introduction in rhyming verse addresses navigation, oceanic geography, Portuguese and Spanish discoveries, and the Mediterranean region.

THE MINERAL KINGDOM

Minerals are the inanimate generated bodies closest to the classical elements of fire, air, water, and earth. Qazwini distinguishes malleable forms like gold, silver, copper, lead, and iron from hard forms, such as turquoise, ruby, and emerald. Individual entries in the cosmography often cite Aristotle (d. 322 BCE) and integrate other fields of knowledge relevant to each mineral, including geography, meteorology, medicine, chemistry, alchemy, theology, magic, folklore, and practical crafts.

For Qazwini, part of the wondrous nature of minerals derives from "how they are extracted, refined, and turned into ornaments, implements, and vessels." These objects and others throughout the exhibition represent some of the minerals described in *Wonders and Rarities*, highlighting the special properties and artisanship associated with them in courtly and daily life through centuries of Islamic civilization.

Cloth of gold with falcons

Central Asia, mid-13th century
Silk and gold thread; lampas
The Cleveland Museum of Art, Edward L. Whittemore Fund, 1996.297

This textile and the adjacent example represent the high-quality Mongol cloth called *nasij*, from the Arabic *nasij al-dhahab al-harir* (cloth of gold and silk), which was woven in lampas from silk threads covered in gold, creating a shimmering effect. Here a pattern of double-headed falcons appears against a background of vine scrolls, recalling similar Near Eastern motifs of addorsed or confronting animal pairs.

Textile fragment with phoenixes and dragons

China, Yuan dynasty, 1279–1368
Silk and gold thread; lampas
The Cleveland Museum of Art, Edward L. Whittemore Fund, 1995.73

The adjacent textile from Central Asia and this fragment from China, the seat of the Mongol Yuan dynasty, show how Near Eastern, Central Asian, and East Asian designs and artistic techniques merged on a portable medium valued as currency by the nomadic Mongols, who also prized gold. Here typically Yuan Chinese motifs of the curled dragon chasing a flaming pearl and the phoenix (*feng-huang*) alternate in lobed roundels found in Sasanian, or ancient Iranian, visual culture.

Fibulae

North Africa (Morocco), Amazigh, 19th century
Silver and enameled glass
Brooklyn Museum, Gift of Judith E. Jones, Clinical Professor Emerita, Columbia University, 2010.44

Considered second to gold in purity, silver appears abundantly in Amazigh jewelry from Morocco and Algeria. Among North Africa's Indigenous peoples, the Amazigh largely converted to Islam after the Arab conquests of the Maghrib in the seventh century. A distinctive example of their jewelry is the triangular fibula, or clasp, attached as a pair to a chain or cord and used to fasten garments. This pair is further enhanced with enameled glass or inset with coral, a prized stone mentioned twice in *Wonders and Rarities*.

Tiger-claw necklace

India, Tamil Nadu, ca. 19th century
Gold; gold beads, rubies, emeralds, diamonds, spinels, and tiger claws
The Metropolitan Museum of Art, Purchase, Friends of Islamic Art Gifts, 2018, 2018.197

The jeweled arts of South Asia demonstrate a scope of craftsmanship reflecting the diverse backgrounds and skills of artists who converged at royal workshops. Made in Tamil Nadu, India's southernmost state, this necklace combines the ancient Indian technique of setting stones into highly refined gold (*kundan*) with talismanic motifs grounded in Indic astrology. Its pendants are set with rubies, emeralds, diamonds, spinels, and tiger claws, the latter an ancient Indian motif affiliated with power and protection. The stone arrangement is associated with the *Navaratna*, Sanskrit for "nine gems" (though in this case there are ten pendants), which are connected with talismanic properties in Hindu, Jain, and Buddhist astrological traditions.

Turban ornament

India, probably Deccan, late 17th century
Gold; enameled and set with emeralds and diamonds
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 1767 J

Jeweled arts appear abundantly in paintings from Mughal and Rajput courts and the Deccan, providing context for their use and value in Indian courtly society, where they were considered emblems of rulers' authority or presented as gifts to courtiers and dignitaries. Gems were also treasured in their pure forms. This plume-shaped turban ornament made in gold, enameled, and set with emeralds and diamonds was crafted using the *kundan* technique. The stones are inserted into highly refined gold that has been placed over a layer of lac, a natural resin. More gold is then applied around the edges to complete the setting. The combination of enameling and *kundan* is considered a Mughal phenomenon.

Bead inscribed with the names of Akbar, Jahangir, and Shah Jahan

Mughal India, 971 AH (1563–64) and 1038 AH (1628–29)
Spinel; cut and drilled
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 2107 J A

This spinel bead bearing the names of three Mughal emperors—Akbar (r. 1556–1605), Jahangir (r. 1605–27), and Shah Jahan (r. 1628)—illustrates the royal custom of inscribing precious gemstones passed down by successive rulers as dynastic legacies. The inscription naming Shah Jahan dated to the first year of his reign includes his title, *Sahib Qiran-i Thani* (Second Lord of the Conjunction), which emphasizes the Mughals' lineage from their great ancestor, Timur (r. 1370–1405), the first to hold this epithet.

Detail of Shah Jahan inscription.
Courtesy of the al-Sabah Collection,
Dar al-Athar al-Islamiyyah, Kuwait.

Pair of archer's rings

Mughal India, ca. 17th century
Nephrite jade and silver, inlaid with floral scroll
of rubies and emeralds set in gold
Islamic Arts Museum Malaysia, 2020.8.21, 2019.18.13

Archer's ring

India, 17th century
Agate
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 747

Originally designed both to release arrows with accuracy and to prevent injuries, these thumb rings also served as status symbols when offered by rulers as tokens of appreciation. One example is made of agate (*ʿaqiq*), which Qazwini writes is found in mines located on islands of the Persian Gulf.

Jade Arts

In the post-Mongol period, jade was valued from China to Iran for its purity and durability. It was associated not only with status, wealth, and power, but also with healing, prolonging life, and immortality. Sources from the late tenth to eleventh century and beyond provide information about the stone's source and beneficial properties, such as quenching thirst or detecting (by cracking upon contact) and neutralizing poison. In India, jade retained its status as a "victory stone" and talisman under the Mughals (1526–1858), descendants of the Turko-Mongol Timurids, who ruled Iran and Central Asia from 1370 to 1506.

Huqqa base

Mughal India, ca. 1740–80
Nephrite jade; carved and inlaid with floral scroll composed of rubies, emeralds, and diamonds set in gold
Islamic Arts Museum Malaysia, 2020.8.51

Tobacco was introduced to South Asia by the Portuguese in the late 1500s. The practice of smoking it through a water-pipe (*huqqa*, or hookah) became a common court pastime in seventeenth-century India. The hot-water chambers of the pipes were initially made of coconut shell and later of decorated glass, metal, or jade, as in this gem-encrusted example.

Signed by Shir Ahmad

A horse-headed dagger (*khanjar*) with sheath

Northern India, 1675–1725 (hilt); ca. 1750–1800 (blade)
Blade: steel; hilt: nephrite jade; inlaid with rubies and pearls set in gold; sheath: velvet; mounted with nephrite jade
Islamic Arts Museum Malaysia, 2020.8.31

Bowl

India, 1650–1700
Nephrite jade, carved
Islamic Arts Museum Malaysia, 2020.8.57

THE PLANT KINGDOM

Distinguished by their animate nature in growth, plants follow minerals in Qazwini's cosmography. Drawing from the writings of philosophers and physicians like Dioscorides (d. ca. 90), Galen (d. 216), and Ibn Sina (d. 1037), Qazwini's descriptions of plants and their properties also emphasize their wondrous qualities. The author marvels, for example, at the way in which a tree is nourished, from the moment water touches its base, rising through the trunk to its branches, leaves, and fruit. He contemplates the "amazing aspect of the Creator's handicraft" in designing leaves to provide both ornament and protection. The many illustrations of the plant kingdom in surviving copies of *Wonders and Rarities* suggest this was one of the most frequently illustrated parts of the book.

Miskin and Durga

The Chironji Nut and Date Palm

Folio from a manuscript of the *Baburnama* (Memoirs of Babur)
Mughal India, ca. 1589
Ink, opaque watercolor, and gold on paper
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.283

The *Baburnama* recounts the observations and experiences of the Mughal empire's founder, Babur (r. 1526–30), traveling from the Ferghana Valley (mainly in contemporary Uzbekistan) to Delhi. Translated from Chagatay into Persian in 1589, it was copied and illustrated by his successors. Babur's interest in natural phenomena appears in detailed descriptions of the species he encountered, such as the *chironji* nut (a fruit) and date palm discussed on this folio from the ca. 1589 copy. Babur's observations recall Qazwini's description of this "blessed tree," noting it is not native to India and resembles an animal because the species exists in male and female forms to reproduce.

Zíft-i rumí

Folio from a manuscript of *The Wonders of Creation and the Rarities of Existence*
Iran, Isfahan, ca. 1650
Ink, opaque watercolor, and gold on paper
Asian Art Museum, Gift of Elton L. Puffer, 2004.55

Al-Kashín

Folio from a manuscript of *Khawass al-ashjar* (*De materia medica*) by Dioscorides
Iraq, 13th century
Ink and opaque watercolor on paper
The San Diego Museum of Art, Gift of Dr. and Mrs. Edwin Binney 3rd, 1972.219

De materia medica (*On Medical Material*), a treatise on the medicinal properties of minerals, plants, and animals, was written by the Greek physician Dioscorides in the late first century BCE. It became one of the most widely translated, copied, and disseminated scientific texts throughout Europe and the Islamic world, forming the basis of later sources on medicine and pharmacology. The Arabic translation, produced from a Syriac translation of the Greek, was completed in the ninth century. This folio from an Arabic copy depicts an unknown plant species from root to tip, with text providing alternative names and describing its habitat, color and texture, and benefits for skin infections, hemorrhoids, burns, tumors, and ulcers.

MATTER TRANSFORMED: THE ARTS OF FIRE AND EARTH

Metalwork, glass, and ceramics—the arts of fire and earth—are so common in our lives today that we often do not consider how they are made. Whether Qazwini interacted with craftspeople or gathered information from texts, his cosmography suggests some direct knowledge of various production methods involving the arts of fire and earth.

The premodern science of alchemy, which sought to transform materials from one substance into another using fire and knowledge of physics and chemistry, was applied to metallurgy, glassmaking, and pigment production.

Displaying innovations in metalwork, ceramics, and luster technology, works shown here represent centuries of persistence and experimentation by artisans who used their minds and hands to transform the earth's elements into objects of beauty and utility through the manipulation of fire.

Earth, Fire, and Pottery

In the 1100s, revolutionary technological innovations changed ceramic production and decoration in Iran, inspiring new techniques and styles. In his 1301 treatise, Abu'l Qasim of Kashan, who belonged to a famous family of potters, gives the recipe for stonepaste, a silica-based material developed in Egypt that replaced earthenware as the main ceramic body. The rise of luxury vessels at this time coincided with the use of techniques such as luster, underglaze, and overglaze painting. The earthenware and stonepaste vessels displayed here were fashioned from molds and some were decorated with mineral-based glazes.

Jug with Arabic inscription advising “…drink with enjoyment and fulfillment”

Iran, possibly Kashan, late 12th century
Stonepaste; molded, glazed, and splashed with cobalt blue
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 127 C

This handled jug with molded inscriptions would have been made with an earthenware master mold containing the final design in positive, as it was meant to appear on the finished vessel. A splash of cobalt ran out of control in the clear glaze over the jug’s ivory body, and its delicate, translucent stonepaste walls were so thin that they began to collapse in the kiln during firing, causing a slight sag on one side.

Bath scraper in the shape of a lion

Iran, late 11th–12th century
Stonepaste; molded, incised, and glazed in transparent blue
The Metropolitan Museum of Art, Gift of Mrs. Charles S. Payson, 1969, 69.212

This bath scraper was used to exfoliate rough or dead skin; many were made in the shape of lions or other animals, echoing similar images on the walls of the hammam, or public bath.

Sphero-conical vessel

Iran, 12th–13th century
Stonepaste; carved under a turquoise glaze
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 362 C

Sphero-conical vessel

Excavated in Iran, Nishapur, 9th–10th century
Earthenware; unglazed and incised
The Metropolitan Museum of Art, Rogers Fund, 1940, 40.170.230

Sphero-conical vessels survive in the thousands, fragmentary and whole, across a range of materials, including earthenware, stonepaste, and glass. Some are further elaborated with stamped or molded designs, glaze, or luster. The vessels' purpose is debated, with theories ranging from their being used as hand grenades or lamps to being containers for toxic or fermented liquids. The earthenware example here either took a knock on its way into the kiln or slumped during firing, its thick wall collapsing slightly inward before becoming fixed forever in the fire.

Jar

East Iranian world, reportedly from Afghanistan, 10th–12th century
Earthenware; unglazed, applied, and stamped
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 883 C

Teardrop- and rosette-shaped stamp molds

East Iranian world, reportedly from Ghazni (Afghanistan), 11th–12th century
Earthenware; unglazed and incised
The al-Sabah Collection, Dar al-Athar al-Islamiyyah,
Kuwait, LNS 888 C (f), LNS 887 C (m)

This jar was decorated using three different techniques: incision with a sharp tool, stamping with a flower-shape mold, and application of bosses (raised ornaments) that were likely made in molds before being attached to the surface of the turned vessel with slip (liquid clay).

The almond-shaped motifs around the neck and the flower-shaped bosses around the shoulder resemble fired earthenware stamps reportedly found inside a jar near Herat, Afghanistan. The stamps displayed here would have been used to create similar raised motifs on other earthenware vessels.

Master mold

East Iranian world, reportedly from Herat (Afghanistan), 12th–13th century
Earthenware; molded, carved, and unglazed
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 1039 C

Master molds were created using various techniques, including carving directly into the clay core, repeated decorations made with stamps, or the attachment of pre-formed elements. This mold bears the unusual inscription, "made by the *faqih* of Samarqand." The title *faqih* usually refers to a scholar of Islamic jurisprudence.

The main body inscription comes from a tenth-century Arabic poem referencing the legal status of alcohol as haram (forbidden) in Islamic law and—appropriately enough for a pitcher intended to hold liquid—advises the reader to drink only cooked wine.

Glassmaking

Qazwini's text suggests the author had some technical familiarity with glassmaking, or at least an accurate understanding of earlier writings on the subject. He correctly observes in the cosmography's mineralogy section that glass can be made by heating sand (silica) with magnesium oxide or soda ash inside a domed furnace. He also notes that glass is a soft mineral—referencing its relatively low melting point and the long, malleable work time of soda-lime glass—and receptive to pigment. The latter quality was exploited with great skill by Islamic glassworkers, who also mastered other techniques such as enameling, gilding, and luster.

Handled jug

Iran, 12th century
Translucent dark blue glass; mold blown and applied; tooled on the pontil
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 100 G

Beaker

Egypt or Syria, 8th–9th century
Translucent pale blue and opaque white glass; free blown,
applied, and marvered; tooled on the pontil
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 52 KG

This vessel was made by feathering white glass across a transparent blown cobalt-blue body while both were still malleable from the furnace. The beaker was then rolled (marvered) to press the white glass trails opacified with tin oxide into the surface of the blue.

Huqqa base

India, Gujarat, ca. 1700
Translucent grayish colorless glass; free blown;
enameled and gilded; tooled on the pontil
The San Diego Museum of Art, Gift of Catherine and Ralph Benkaim, 2006.315

Indian *huqqa* bases from the late 1600s–early 1700s suggest that the accouterments of smoking tobacco, a courtly pastime, had become highly refined. Decorations with floral designs evoked gardens or created wondrous bubble patterns visible in glass examples.

Tray stand

Egypt or Syria, late 13th–early 14th century
Translucent brownish colorless glass; free blown,
enameled, and gilded; tooled on the pontil
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 53 G

This stand would have functioned as a portable table, supporting a large, circular food tray. Gold vine scrolls on blue ground begin the decorative scheme, succeeded by roundels containing the courtly emblem of the *bunduqdar* (keeper of the bow). The latter alternate with lotuses or *simurgh*s, mythical Persian birds resembling phoenixes, in one register, followed by a band of quadrupeds in the next. The stand's base repeats the bands in opposite order.

Basin inscribed with verses

Egypt or Syria, late 13th–mid-14th century
Copper alloy; hammered from sheet, engraved, and inlaid with silver
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 110 M

This formidable basin represents how metals—worked in their pure form or as alloys—were transformed into awe-inspiring specimens. Inscriptions in Arabic *thuluth* script praise an amir serving a sultan named al-Nasir, possibly the Mamluk sultan al-Nasir Muhammad ibn Qalawun (r. ca. 1293–1341, with brief interruptions). The inscriptions are embellished with bird and lotus motifs, a Z-fret geometric pattern, and floral scrolls.

The Story of Luster

The Islamic luster technique is first known from Iraq in the eighth and ninth centuries, but the inspiration for its development may have come from luster-stained glass produced in Egypt. The movement of potters traveling with the secrets of their trade may have played a role in the technique's transmission to Egypt, Syria, Iran, and Spain in the eleventh and twelfth centuries. By the fifteenth century, the technique was practiced in Italy, where it underwent a revival in the nineteenth century, eventually reaching Britain as well.

Composed of silver and/or copper oxides, luster is applied to an object's surface to create a metallic sheen. On glass, the application of luster results in a dark stain, while on ceramic wares, the metallic pigments, which must be applied over an opacified glaze in a second firing, achieve a more reflective sheen.

Cup

Egypt or Syria, 7th–8th century
Translucent pale blue or bluish colorless glass; free blown,
pinched, and stained; tooled on the pontil
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 319 G

Bowl fragment

Egypt or Syria, 8th century
Translucent grayish colorless glass; blown and stained
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 180 G

This cup decorated with standing figures and winged creatures and the fragment of a glass bowl are rare examples of “stained” designs on glass, made by painting with metal oxide pigments onto blown clear glass and then firing at a low temperature to bond the pigment with the glass.

Bowl with ibex

Egypt, Fustat, 10th–12th century
Earthenware; painted in monochrome luster on an opaque white glaze
The Cleveland Museum of Art, Purchase from the J. H. Wade Fund, 1944.477

Eleventh-century Egyptian pottery painters were notable for creating a world of elaborate, inventive, and sometimes strikingly naturalistic animal and figural designs in luster. An ibex's body fills the basin of this bowl. The animal is held in tension with thickly painted forms and heavy vegetal grounds, creating large fields that showcase the luster medium in a manner similar to tenth-century Iraqi wares.

Bowl with half-palmettes

Iraq, 9th century
Earthenware; painted in polychrome luster on an opaque white glaze
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 9 C

This bowl demonstrates the wondrous visual effects achieved by ninth-century Iraqi potters who decorated tin-glazed earthenwares with multiple metallic oxide mixtures to create dense, rich designs over the white of the tin glaze. The reflective effect results from reactions in the second firing between the tin and lead in the white glaze and the metal oxides of the luster "paint." Here the revolving centripetal design of four half-palmettes against a patterned ground comes from both a silver-based oxide (to create a greenish-golden luster) and one containing copper (to create a ruby-red luster). The bowl's form derives from Chinese models imported via maritime trade.

Bowl with long-eared quadruped

Iraq, 10th century
Earthenware; painted and inscribed in monochrome
luster on an opaque white glaze
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 410 C

By the tenth century, Iraqi luster potters decorated with a single shade, usually an olive-green or brownish-golden luster made from silver-based oxide paint. Perfecting the firing process to achieve maximum consistency in the metallic sheen of the golden color, they created bold, abstracted figural designs like the curious creature—with ears like a hare but the body of a longer-legged quadruped—on this bowl.

Dish

Spain, Valencia, Manises, 16th century
Earthenware; painted in luster over an opaque white glaze
The San Diego Museum of Art, Gift of Edwin Binney 3rd, 1971.73

Luster production flourished from the 1300s–1500s as part of a ceramic industry throughout the Iberian Peninsula. Most wares were made by Muslim craftspeople living under Christian rule, known as Mudéjar after an Arabic word meaning "tamed," although Christian potters also participated in the industry.

Manises lusterware is distinguished by largely nonfigurative designs composed of abstract plant forms. Animal figures, however, may appear inside coats of arms, as seen in the eagle design of this bowl. Several surviving dishes include punctured holes in the rim like the ones above the eagle's head, suggesting that these wares were also enjoyed as display pieces when not in use. Such fine lusterwares were made for the church or for private devotion, but many were also commissioned by prominent members of Iberian society in the fifteenth century.

Bowl fragment depicting male head

Egypt, 11th century
Earthenware; painted in monochrome luster on an opaque white glaze
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 21 C

This unique bowl fragment depicts the species Qazwini ranks between the animals and the angels—humankind. A thin, delicate line details the man's face and turban against a shining golden luster ground, retaining the wondrous alchemy of the medium while exploring pictorial representation.

Bowl with figures, inscribed with Persian verses by Shams al-Din Tabrizi and Baba Afzal al-Din Kashani

Iran, possibly Kashan, early 13th century
Stonepaste; painted in monochrome luster and
cobalt blue on an opaque white glaze
Brooklyn Museum, Gift of the Ernest Erickson Foundation, Inc., 86.227.16

This dish depicts a group of figures seated around a narrow tree on which a bird is perched. Above them, a cobalt-tinged canopy decorated with a pattern of stylized, scrolling split palmettes topped by a scalloped border suggests an abstract blue sky, and the lowest segment represents a pond with swimming fish.

While this tripartite image does not appear to be narrative, the presence of a bird, a familiar theme in Persian mystical literature, and human features associated with light (such as the moon-shaped faces) set the tone for mystical verses appearing in two bands around the rim and interior. The text includes poetry by Rumi's spiritual master Shams al-Din Tabrizi (d. 1248) and possibly Baba Afzal Kashani (d. ca. 1214). Although the image and text on this dish do not correspond directly, they lend themselves to more profound mystical interpretations; these are enhanced by the glimmering quality of the luster, which evokes wonder as it blurs the line between the illusory and the real.

THE ANIMAL KINGDOM

Characterized by growth, movement, and sensory perception, animals occupy the most complex category of the earth's beings and appear in numerous stories and descriptions throughout the cosmography. Qazwini classifies them into seven types, ranging from humans to insects and ending with animals of "strange forms and shapes," which include hybrid and mythical creatures.

Composed of spirit and body, humans are described as microcosms for all existence, simultaneously exhibiting the growth of plants, the movement and sensory perception of animals, and the understanding and intelligence of angels. Among Qazwini's sources for this section are bestiaries such as the *Kitab Tabaʾiʿ al-hayawan wa khawasiha wa manafiʿ aʿdaʾiha* (Book of the characteristics of animals, their attributes, and the usefulness of their organs), written by the Nestorian Christian Syriac physician Ibn Baktishu (d. 1058).

A Persian Courtier

Single-page painting mounted on a detached album folio
India, Deccan, possibly Bijapur, ca. 1615
Ink, opaque watercolor, and gold on paper
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.457

Described by Qazwini as microcosms of the universe, humans are considered the first and noblest of the animal kingdom, fashioned by God into an ideal form composed of spirit and body. This portrait, from an album assembled at a Muslim court in the Deccan, depicts a Persian courtier or prince in an extraordinary costume of brocaded textiles: a tunic with images of musicians and other courtly figures, and trousers depicting a scene from the romance of the Iranian king Khusraw and the Armenian princess Shirin.

Another wondrous detail, a European engraving in the figure's hand, appears to depict St. Bernard of Clairvaux with the tools of Christ's Passion. Verses by the Indo-Persian poet Amir Khusraw Dihlavi (d. 1325) provide a final framing for this work, a source of entertainment and delight for those who examine both text and image.

Bowl with gazelle

Iran, possibly Kashan, 1250–1300
Stonepaste; painted in monochrome luster on an opaque white glaze
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 301 C

Among ruminants, the fourth animal type, Qazwini considers the gazelle a clever but nervous creature. He marvels at the manner in which the gazelle consumes fresh colocynth (bitter melon/gourd), allowing its juice to dribble out of its mouth as if savoring the experience. This bowl is one of the finest examples of luster-painted luxury stonepaste wares associated with the production center of Kashan, Iran, from the twelfth century onward.

Stirrup

East Iranian world, ca. 12th–14th century
Bronze; cast
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 79 M

Horses, classified as beasts of burden (Qazwini's third animal type) are described as best in form among animals. Qazwini praises their proportionality, color, speed, intelligence, and obedience, and lists the beneficial properties associated with them, such as reducing pain in teething children or helping women through difficult childbirths. This esteem for the horse was not only apparent in Qazwini's time, under the reign of the nomadic conquerors of Iraq, Iran, and Central Asia, but existed long before and endured long after.

Crab (kharchang)

Folio from a manuscript of the *Kitab Tabaʾiʿ al-hayawan wa khawasiha wa manafiʿ aʿdaʾiha* (Book of the characteristics of animals, their attributes, and the usefulness of their organs)
Iran (Tabriz or Kashan) or Iraq (Baghdad), early 14th century
Ink, watercolor, and gold on paper
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 54 MS (recto)

This folio depicting a crab comes from a copy of a Persian translation of an eleventh-century Arabic treatise on the physical characteristics and organs of animals. Derived from Aristotelian sources, the original text was translated into Persian after Qazwini's death, but the author would have been familiar with its Arabic version. In Qazwini's cosmography, the crab entry appears in the description of animals found in the Caspian Sea.

A Doe Nursing Her Fawn

Single-page painting mounted on a detached album folio
Mughal India, ca. 1560
Ink, opaque watercolor, and gold on paper
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.272

The fourth animal type classified in *Wonders and Rarities* consists of ruminants, or even-toed ungulates, such as the giraffe, cow, sheep, gazelle, and deer. Qazwini characterizes them as "numerous, of great benefit, easily domesticated, submissive, and tameable."

This painting is from a now-dispersed early Mughal album that contained another painting of ruminants featuring a cow and her calf. These paintings attest to the production of such studies in the imperial Mughal atelier from the beginning of Akbar's reign (r. 1556–1605), rather than that of emperor Jahangir (r. 1605–27), who is usually considered to be the great Mughal patron of painting of the natural world.

A Nilgai

Single-page painting mounted on a detached album folio
Mughal India, ca. 1655
Ink and opaque watercolor on paper
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.360

Native to the Indian subcontinent, nilgai were hunted during the Mughal period (1526–1858). This painting of a nilgai, or blue bull, another ruminant, was produced under the Mughal emperor Shah Jahan, who followed in the footsteps of his father and grandfather in his love of flora and fauna and patronage of animal portraiture. Animal studies were a popular subject in Mughal painting as they combined imperial patrons' interests in specific observation, the hunt, and the discovery of new species encountered in their travels or conquered regions—all of which could be seen as an open appreciation for the wonders of divine creation.

A Flamingo

India, ca. 1780
Ink, opaque watercolor, and gold on paper
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.1368

Although not mentioned in Qazwini's cosmography, flamingoes would have been regarded as marvels by the British commissioners of the album in which this painting was included. During the last quarter of the eighteenth century, British East India Company personnel compiled such paintings in large-scale natural history albums to be admired, studied, and collected in both India and Britain. In contrast to the depiction of the hoopoes nearby, the grandeur of this page lies in its size and starkly blank background. An Urdu inscription labels the flamingo as *hansa*, a general term for an aquatic bird.

Hoopoes

Single-page painting mounted on a detached album folio
Mughal India, ca. 1600
Ink, opaque watercolor, and gold on paper
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.349

Birds, identified by their light bodies and lack of many limbs, make up the sixth animal type described in *Wonders and Rarities*. This album folio features a pair of hoopoes, described by Qazwini as birds "of amazing form and beautiful voice but foul odor."

Recorded in the Qur'an as Solomon's messenger (27:20–28), the hoopoe was also admired by Mughal emperors who commissioned carefully observed paintings of favorite animals to study, admire, and collect in royal albums. In this case, the hoopoe's precious status is emphasized not only by the detailed treatment of the birds, but also by illuminated borders containing the elegantly calligraphed Arabic phrases *fi'l-imani* (in faith) and *fi'l-rifaqihi* (in friendship) and blue margins embellished with gilded drawings of fabulous winged lions and Chinese-inspired clouds.

Incense burner in the shape of a feline

East Iranian world, 12th–13th century
Bronze; cast in openwork, inlaid with turquoise-glazed faience and glass eye
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 1218 M

Zoomorphic incense burners were popular in medieval Iran and Central Asia, with many examples resembling the shape of a lion. Qazwini distinguishes lions as the most fearsome, courageous, and powerful among the feral beasts, singled out by God for physical traits like its fangs, claws, and loud roar. The lion was also associated with healing properties. A mixture of lion brain and aged oil were thought to cure paralysis; carrying a lion's tooth could prevent a toothache.

To use this incense burner, one would lift open the head from the feline's shoulder to place coal and incense inside. When lit, the scented smoke would waft through the pierced neck and body to fill the room.

Ten-pointed star tile with elephant

Iran, probably late 12th–early 13th century
Stucco; molded and carved
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 32 ST(c)

Qazwini reports feral beasts as the fifth animal type, likening them to devils for their "pride, wrath, meanness, disruptiveness, lack of empathy, and readiness to kill." These include creatures such as the elephant, jackal, rabbit, hyena, lynx, and felines.

A Mythical Bird

Folio from an unidentified cosmographical manuscript
India, 1750–1800
Ink, opaque watercolor, and gold on paper
Asian Art Museum, Gift of George Hopper Fitch, B87D16

A Mythical Peacock with a Human Head

Folio from an unidentified cosmographical manuscript
India, 1750–1800
Ink, opaque watercolor, and gold on paper
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.531

Each of these detached folios depicts a strange or fantastical creature. One resembles a version of the mythical *ʿanqa* described in *Wonders and Rarities* and the other represents a hybrid creature composed of a human head and peacock's body. The painting style, folio size, and calligraphy on the reverse of each indicates they probably belong to the same manuscript. The Persian text does not appear to be Qazwini's, but may come from another source of wonders literature circulating in eighteenth-century India.

HUMANITY, CUSTOMS, AND CRAFTS

Therefore divine wisdom has decreed that people should congregate in cities and villages, and every group should practice one of the skills so that the skills of all people be perfected and the needs of all fulfilled....What is amazing is that the Creator has made the calling of every practitioner beautiful in His own eyes.
—Zakariyya ibn Muhammad al-Qazwini

Recent research has revealed that Qazwini composed a Persian edition of *Wonders and Rarities* in addition to the original Arabic version. The Persian edition includes an expanded text dedicated to human diversity, customs, and crafts. The discussion of the latter identifies twenty "crafts" representing the wide spectrum of both fundamental and dispensable—but nonetheless desirable—skills and arts: agriculture, shepherding, hunting, weaving, building, ironmongery, carpentry, trades, accounting, writing, prosody, music, medicine, adornment, eliminating human imperfections, astrological determinations, the astrolabe and how to use it, magic squares, talismans, and spells.

Qazwini emphasizes that human crafts are valuable not only because they are so deemed by God, but also because they bring personal fulfillment. The works in this section of the exhibition engage aspects of material culture, science, and craftsmanship to convey the times and places in which they were made. Sometimes they weave in personal stories about the maker or patron. By incorporating Islamic crafts into their practice, contemporary artists and craftspeople help preserve the diverse, vibrant, living traditions of the Islamic world.

HEALING, PROTECTION, AND ADORNMENT

Several crafts described in Qazwini's Persian expansion of *Wonders and Rarities* address the health and well-being of humans. Among these, Qazwini considers medicine "a noble art" essential to society. Magic squares, talismans, and spells are also identified as crafts associated with Islamic healing traditions.

The craft of adornment may not share medicine's indispensable status, but its extensive presence in Islamic material culture over centuries attests to the great value that beauty and self care hold in society. Examined together, these crafts offer a wider perspective on the art of healing, one that encompasses the overall health, well-being, and protection of humankind. These works embody the remarkable impact of the transmission, adaptation, and practice of medical knowledge across the Islamic world.

Fineleaf Fumitory

Folio from a manuscript of *Khawass al-ashjar* (*De materia medica*) by Dioscorides
Iraq, 13th century
Ink and opaque watercolor on paper
Harvard Art Museums/Arthur M. Sackler Museum, The Norma Jean Calderwood Collection of Islamic Art, 2002.50.140

Written by the Greek physician Dioscorides in the late first century BCE and translated into Arabic in the ninth century, *De materia medica* (*On Medical Material*) was one of the most frequently copied books in Islamic lands, laying a foundation for later Muslim physicians, scientists, and pharmacists.

The red title above the image identifies this plant as *qafunus*, or fineleaf fumitory (*Fumaria parviflora*). Every aspect of the plant is depicted, from its roots to the tips of its leaves, following the conventions of herbal illustration, which were also followed by early *Wonders and Rarities* manuscripts. In this way the images would give as much information about the plants as possible, since the verbal descriptions often referred to various parts of the plants. In the case of fineleaf fumitory, the text describes it as having small, grayish leaves and purple flowers, then continues to its uses: its sharp juice apparently makes eyes water and, when mixed with glue, could be used to discourage the growth of eyebrows. When eaten, the herb causes patients to excrete bile.

The Colocynth Plant

Folio from a manuscript of *The Wonders of Creation and the Rarities of Existence*
Iran, Isfahan, ca. 1650
Ink, opaque watercolor, and gold on paper
Asian Art Museum, Gift of Elton L. Puffer, 2004.56

This folio depicting the colocynth plant (*Citrullus colocynthis*) from a dispersed Persian manuscript of *Wonders and Rarities* illustrates one of the many references to medicinal properties existing in plants, minerals, and animals throughout the natural world. Known commonly as bitter apple, bitter cucumber, or wild gourd, colocynth is described as being avoided by all animals except for gazelles, who enjoy it. The plant's medicinal properties include stopping nosebleeds and treating melancholia, epilepsy, leprosy, elephantiasis, sciatica, and gout. Citing the Persian physician Ibn Sina, Qazwini adds that fresh soaked and sprinkled colocynth leaves can rid a home of fleas and concludes with the plant's benefits as an antidote to snake bites and scorpion stings.

Pantea Karimi (American, b. Iran)

Suspended Healing Garden

2019
Laser-cut paper, fishing line, screen-printed text, and wooden rods
Collection of the artist

Suspended Healing Garden draws on Karimi's childhood memories of browsing traditional drugstores in the city of Shiraz, Iran, with her grandmother who believed in the healing power of herbal medicine. The inverted portrayal of plants is a metaphor for the upheaval of immigrant life. The plants are modeled after medicinal ones depicted in a twelfth-century Arabic botanical manuscript by Abu Jaʿfar al-Ghafiqi, *Kitab fi'l-adwiya al-mufrada* (Book of simple drugs), which includes some four hundred hand-drawn and colored images of plants and animals, popularly known as the *Herbal of al-Ghafiqi*.

Medicine in Text and Image

Qazwini's references to medicine and the key scholars who advanced its study reflect the history of medicine in the medieval Islamic world. This history, which includes pharmacology, drew largely from Greek medicine, beginning with Hippocrates (d. ca. 370 BCE) and the physician and philosopher Galen (d. ca. 216), whose theory of the four humors became the foundation for the studies of anatomy, physiology, and other medical sciences. This historical foundation would become the groundwork for the subsequent contributions of Muslim physicians and scientists, some of which are highlighted through the works displayed here. It also integrated elements from ancient and sometimes esoteric regional traditions involving magic and divination.

Manuscript of *Tashrih-i Mansuri* (Mansur's anatomy)

Iran, 16th century
Ink and opaque watercolor on paper; leather binding
Islamic Arts Museum Malaysia, 2019.12.10, ff. 13b–14a

Known also *Tashrih-i badan-i insan* (Anatomy of the human body), this well-known Persian text on human anatomy by the physician Mansur ibn Ilyas (fl. 1380–1422) acknowledges the contributions of earlier Greek and Muslim physicians and the Prophetic tradition on medicine, which was based on remedies in the Qur'an. Devoting six chapters to different areas of the body, it became associated with a set of images illustrating human bodily systems, each presented as a full-figure diagram of a person in squatting position; the human skeletal system and its parts are identified here.

Abu al-ʿAla ibn Jabir al-Basri (scribe)

Surgical Instruments

Manuscript of *Al-Bayan fi tashrih al-abdan* (Explanation of human anatomy)
Iraq, 19th century
Ink and opaque watercolor on paper; leather binding
Islamic Arts Museum Malaysia, 2012.2.29, ff. 19b–20a

This Arabic treatise was meant to serve as a source of anatomical knowledge and aid for the diagnosis and treatment of diseases. It also advises readers to consult other medical treatises. The text includes part of the Hippocratic Oath taken by all physicians and devotes sixteen chapters to the anatomy and physiology of different body parts. As with *Tashrih-i mansuri* shown nearby, the manuscript contains diagrams of the human body as well as colorful illustrations of surgical instruments identified here as specula, a scalpel for dissecting tumors, a tooth extractor, and cautery irons.

Manuscript of the *Kitab Tibb Melayu* (Malay book of medicine)

Malay Peninsula, 19th century
Ink on paper
Islamic Arts Museum Malaysia, 1998.1.2915, ff. 7b–8a

Islam became established in the Malay Archipelago in the early seventeenth century throughout the kingdoms of Sulawesi. Written in Jawi script, this manuscript represents a wider corpus of books incorporating Islamic and Malay healing traditions, which address health matters from common ailments to illnesses caused by spirits or jinn and provide information on treatments through recitation of Qur'anic verses or hadiths. The traditions also incorporate amulets, talismans, and magic squares into healing practice. These folios include a magic square and other talismanic symbols meant to treat epilepsy and worm infections in children.

Hafiz Muhammad Khan (scribe)

Manuscript of the *Farasnama-yi Rangin* (The book of the horse by Rangin)

India, 10 Dhu'l-hijja 1296 AH (November 25, 1879)
Ink and opaque watercolor on paper; leather binding
Islamic Arts Museum Malaysia, 2012.11.54, ff. 47b–48a

Farasnamas were manuals on horses, horsemanship, and veterinary medicine derived from a variety of sources, including Greek, Arabic, Persian, and Sanskrit. This manuscript is an Urdu example of the *Farasnama* (Book of the horse) of Saʿadat Yar Khan (d. 1835), known as Rangin (the Colorful), a poet who was skilled in multiple languages as well as accounting and equine veterinary practice. Penned in verse, it combines Qazwini's crafts of medicine and prosody, the latter referring to the patterns of rhythm and sound in poetry.

Hanuman Brings Healing Herbs to Rama and Lakshmana

Folio from a manuscript of the *Ramayana* (Story of Rama)
Mughal India, ca. 1590
Ink, opaque watercolor, and gold on paper
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.290

In India, the integration of Galenic and Ayurvedic sources into Persian medical texts may be viewed within the context of a similar syncretism expressed in its visual culture, a result of contact between artists, scholars, and others from Hindu, Perso-Islamic, Christian, and European backgrounds. This painting and a nearby work displaying a cupping treatment represent the coexistence or assimilation of diverse traditions in art and medicine. The present folio comes from a manuscript of the *Ramayana* (Story of Rama), an ancient Sanskrit text about the life and adventures of the legendary Prince Rama, completed around 1590 under the Mughal emperor Akbar (r. 1556–1605). It depicts the miraculous effects of healing herbs from the Himalayan mountain peaks used to treat the apparently mortally wounded Lakshmana.

A Woman Cupping Another

India, ca. 1815
Ink and opaque watercolor on paper
The San Diego Museum of Art, Edwin Binney 3rd Collection, 1990.1377

Composed in a generic, European-inspired setting, this painting illustrates the medical practice of cupping, which uses vacuum force to draw blood to the skin's surface as a remedy for physical ailments. The woman at right presses a glass cup—an example of which may be seen in a nearby case—in which the air has been heated onto the other woman's back. Indian artists were commissioned to depict such "exotic" local customs and occupations by British personnel of the East India Company, who then used the images to illustrate and validate reports of their experiences in India upon returning to Britain.

Tools and Objects of Medicine

These works represent objects and scientific instruments related to the preparation, storage, and practice of medicine or healing traditions. Most could also serve other functions in daily life or for other trades, including the preparation of food, ink and pigment for writing and painting, or working with metals.

Medicinal spoons

Iran, 10th century
Copper alloy
Islamic Arts Museum Malaysia, 2013.16.35, 2013.16.36, 2013.16.37, 2013.16.39

This group of double-ended spoons may have been used to measure, scoop, and filter ingredients for preparing medicine. The central hinges and the inverted directions of the heads on one example also recall a hydraulic device illustrated in a 1354 copy of *Kitab fi Maʿrifat al-hiyal al-handasiya* (The book of knowledge of ingenious mechanical devices) by al-Jazari (d. 1206), which appears in The Built Environment section of the exhibition.

Medical instruments

Possibly Egypt or Syria, 9th–14th century
Copper, bronze, or brass
The al-Sabah Collection, Dar al-Athar al-Islamiyyah,
Kuwait, LNS 712 M m, LNS 553 M s,
LNS 267 M b, LNS 265 M c, LNS 557 M v

This set of medical instruments attributed to Egypt or Syria between the ninth and fourteenth centuries supports the accuracy of some of the manuscript illustrations representing them, such as in the copy of *Al-Bayan fi tashrih al-abdan* (Explanation of human anatomy) displayed nearby. Some of the pieces may be recognized as earlier versions of currently used surgical instruments, such as the nerve hook, the Cobb elevator, or the Penfield retractor.

Sphero-conical vessel

Iran, 10th–11th century
Translucent yellowish colorless glass; mold-blown; tooled on the pontil
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 1064 G

Much debate surrounds the use of sphero-conical vessels, which survive in great numbers and media, including earthenware, stonepaste, and glass. Theories about their functions include uses as hand grenades, lamps, or containers for perfumes, medicines, or fermented liquids.

Storage or medicinal jar (albarello)

Iran, possibly Kashan, late 13th–14th century
Stonepaste; painted in luster and blue on opaque white glaze
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 302 C

With its distinctive cylindrical shape, contracted waist, and short neck that would be sealed with a skin when in use, the albarello was introduced in Syria as early as the twelfth century for the storage of medicine. This example from Iran depicts flying birds painted in reserve in luster on an opaque white glaze.

Inscriptions on parallel examples from Egypt and Syria alluding to their contents suggest these vessels served an apothecary function. Trade between Europe and the Islamic world during the medieval period encouraged the exchange of medicines and pharmaceutical knowledge between these regions; the impact of cross-cultural artistic transmission resulting from trade, diplomacy, and the movement of artisans can also be seen in jars imitating or adapting the Islamic vessel in Spain and Italy—the latter responsible for the name albarello.

Cupping glass

Iran, 9th–12th century
Glass; blown and applied
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 90 G

Cupping therapy was introduced by Egyptians to Greeks and has been practiced in many parts of the world. The therapy also has parallels in an Ayurvedic blood detoxification technique known as *Ghati yantra*. A nineteenth-century Indian painting displayed nearby illustrates this medical practice, which uses vacuum force to draw blood to the skin's surface.

Mortar

Iran, 12th century
Bronze, cast
Islamic Arts Museum Malaysia, 2013.16.31

Mortars and pestles were used to mix, grind, or pulverize ingredients like seeds, leaves, and minerals in the preparation of pharmaceuticals and food as well as inks, pigments, and glue, thus serving a variety of societal needs. This mortar from Iran has a cylindrical form decorated with lozenges and teardrop-shaped bosses with bands of benedictory inscriptions in Kufic script at the rim and base.

Magic-medicinal bowl

China, 19th century
Porcelain
Islamic Arts Museum Malaysia, 1998.1.3960

The interior of this bowl, a type made for export to South and Southeast Asia from the late eighteenth to early nineteenth century, contains a magic square and an inscription referencing the Prophet's son-in-law Ali, its inclusion meant to invoke him to bring comfort in times of misfortune. On the exterior, four concentric bands include the Qur'an's Throne Verse and other prayers and invocations. Combined on such bowls with God's names, Qur'anic texts, or prayers on such bowls, magic squares were used to harness celestial forces that would imbue the vessel's contents with wondrous effects.

Three water filters with fish, inscription, elephant

Egypt, Fustat, ca. 960–1170
Earthenware; unglazed, incised, and pierced
The al-Sabah Collection, Dar al-Athar al-Islamiyyah,
Kuwait, LNS 600 C, LNS 39 C (e), LNS 39 C (d)

Filters from medieval Egypt were once integral to simple earthenware vessels containing liquid. Pierced panels protected the vessels' contents from insects. Many of these filters have been recovered from the dumps of Fustat (medieval Cairo), now broken off from their parent vessels but with their designs kept intact by the strength of the neck joint around them.

Although easy to produce, the staggering variety and delicacy of the filters' designs evokes wonder. From animals to geometric designs to inscriptions, no two are identical. Here, one example floats a stylized fish against the latticed filter to protect its water. Another reminds users through an inscription (*ʿiff taʿafa*) to refrain from doing harm in order to keep safe, and the third sets an elephant in motion.

Incense burner (*mabkhara*)

Northeast Iran, 12th century
Copper alloy
Islamic Arts Museum Malaysia, 2017.4.21

Tripod censer inscribed in Arabic

China, ca. 17th century
Jade
Islamic Arts Museum Malaysia, 2016.13.1

Incense burners, or censers, dispersed incense, perfume, and kohl for both cosmetic and medicinal purposes. The vessels were used to fill rooms with scents of essential oils or herbs meant to repel insects or cure ailments, their aroma wafting through holes of openwork examples such as one shown here. The jade example includes the Arabic inscription *afdhal al-thikr Allah* (the best remembrance is God).

Signed by Mir Muhammad Baqir al-Husayni al-Isfahani

Scale and counterweight box

Iran, mid-19th century
Painted and varnished wood with steel balances, weights, and tools; suspension cords
Islamic Arts Museum Malaysia, 2004.12.7

The contents of this box, which may have served a pharmacist, include balance scales made of steel beams and brass pans suspended by silk cords, with a pointer to measure equilibrium; steel weights; a tweezer; and a mirror stored in a hidden drawer at the base of the box. The importance of accurate measurements and perfecting scales is emphasized in the Qur'an and documented in practice to prevent fraudulent market activity. Equipment used to measure commodities such as precious metals, herbs, and pharmaceutical roots was inspected frequently.

The box's exterior lid is embellished with floral imagery and inscribed with the Qur'an's Throne Verse (2:255); the artist's signature also appears here. The inscription reaffirmed the container's contents intended to protect believers from evil, illness, and harm; imbued with the verse's talismanic associations, the box would provide an additional layer of healing and protection for the pharmacist preparing remedies or the goldsmith making a talisman. More intimate images of dancing girls and a kneeling couple survive on the bottom of the container and on its interior lid.

Adornment

On the craft of adornment, Qazwini writes: “This is what beauticians do, and both men and women have need of it because beauty is a requisite for both men and women. If nature has endowed something with a modicum of beauty, beauticians enhance it; if not, they bring about something of beauty.”

In settled and nomadic societies, at royal courts and in the daily lives of ordinary people, dress and adornment played a significant role in the expression of status, wealth, and identity across the Islamic world. The objects displayed in this case include items used for beautification, such as combs, mirrors, jewelry, or ceremonial weapons. All could be embellished with gems and precious metals or decorated with talismanic images or inscriptions.

Bath scraper in the shape of a hedgehog or mouse

Possibly Afghanistan, 12th–13th century
Stonepaste; molded with a turquoise glaze
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 531 C

Inscribed stamp mold with a lion

East Iranian world, 11th–12th century
Unglazed earthenware with relief decoration
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 697 C

The importance of personal hygiene in Islamic culture is witnessed not only by the ablutions required for prayer, but also by the use of public baths (hammams), an extension of Roman tradition. Bath scrapers made of earthenware or glazed stonepaste were used to exfoliate the skin. Many were made in the shape of lions or other animals (like hedgehogs or mice), their artisans perhaps inspired by similar images represented on hammam walls.

Mirror

Iran, early 13th century
Bronze; cast
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 102 M

Inspired by Chinese models, medieval Iranian mirrors were cast from a copper alloy that revealed a reflective surface when polished. Mirrors held a talismanic role and could be engraved with “magical” inscriptions for added protection. Qazwini was likely thinking of mirrors like this one when writing that facial paralysis could be cured by sitting in a dark room while looking into a mirror made of bronze or brass. Surviving examples often depict mythical creatures (like the manticores seen here) framed by benedictory inscriptions and may also include astrological or hunting imagery.

Mirror

Mughal India, 18th century
Enameled and gold-wire inlaid jade
Islamic Arts Museum Malaysia, 2008.1.14

Silver comb with turquoise beads

Uzbekistan, Bukhara, 19th century
Fire-gilded and silver-set with turquoise beads, semiprecious stones, and wood
Islamic Arts Museum Malaysia, 2005.5.4

Molar flask

Eastern Mediterranean or Iran, ca. 9th–10th century
Rock crystal
Islamic Arts Museum Malaysia, 2013.7.49

Kohl, a charcoal-like substance generally containing antimony sulfide but also composed of different materials depending on its origin, was used as eyeliner and stored in rock crystal or metal containers. Its application was believed to ward off the evil eye.

Perfume casket

Kashmir, probably 19th century
Silver
Islamic Arts Museum Malaysia, 2021.4.57

Armlet

Iran, 475 AH (1064)
Gold
Islamic Arts Museum Malaysia, 2022.8.6

Decorated with hemispherical domes, rosettes, and inscriptions, this armlet illustrates the rarer survival of objects made of pure metals such as silver and gold. These were often melted down for trade.

Inscriptions around the domes praise God's oneness and sovereignty. Another on the side provides the regnal name of the Abbasid caliph al-Qaʿim (r. 1031–75). Inscriptions around the rims of four discs on the reverse provide a production date of 475 AH (1064) and name the Iranian city of Nishapur.

Dagger and sheath

Mughal India or the Deccan, 18th century
Gem-set jade hilt with gold-mounted sheath
Islamic Arts Museum Malaysia, 2011.7.8

In northern India and the Deccan, jeweled arts conveyed the status of rulers, courtiers, and dignitaries. Often they were exchanged as gifts in a ceremonial audience known as the *darbar.*

Jades carved and inset with semiprecious stones by skilled artisans were fashioned into luxurious accouterments such as this ceremonial dagger.

Choker

India, probably Deccan (Hyderabad), late 18th–early 19th century
Gold, diamonds, emeralds, pearls, and enamel
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 9 J

The decoration on this extraordinary choker blends the Mughal art of enameling on the back of the necklace with the ancient technique of *kundan* on its front. In *kundan*, goldsmiths placed highly refined gold (*kundan*) on a layer of natural resin (lac) before setting in stones and filling remaining cavities with gold to complete the setting.

Woman's headdress

Central Asia, Turkmen, 18th century
Cotton and silver with red stone
Islamic Arts Museum Malaysia, 2006.5.2

In the nomadic and semi-nomadic traditions of the Turkmen people of Central Asia, wealth was largely portable through the mediums of textiles and silver, much of it worn by women. Women dressed in colorful silks, their jewelry and headdresses covering them front and back from head to waist, their age and status communicated through the silver and ornaments on their bodies. The ornaments are characterized by geometric forms such as circles, squares, triangles, with varying designs depending on the tribe. This headdress is decorated with silver plaques, likely melted down from coins, as well as chains, coins, and bells. Along with carnelian and turquoise, silver carried talismanic properties for the Turkmen, adding another layer of significance to their jewelry and ornament.

Hayv Kahraman (Kurdish Iraqi and Swedish, b. 1981)

Decagram No. 2

2013
Oil on panels
Private collection, New York, NY

Hayv Kahraman blends two of the cosmography's listed crafts—medicine and carpentry—in this work from her *Corporeal Mapping* series. Taking cross-section scans of her own body, the artist reconfigures and layers them into geometric forms, comparing their detachment and separation (and rebuilding) into those of people in the diaspora.

The work is composed of two pentagonal "slices" of the cross-section scans, each decorated with a latticed or checkered geometric pattern and superimposed over a pentagonal base depicting a pair of nude female figures modeled after the artist's self-portrait. A Kurdish Iraqi refugee who fled to Sweden in the 1990s before settling in Los Angeles, Kahraman draws from her experiences navigating new languages and cultural boundaries in the diaspora.

WEAVING AND ARTS OF THE BOOK

Qazwini describes weaving as not only indispensable, but as one of the earliest crafts. He writes of Adam weaving clothing from sheep's wool spun by Eve. Weaving's meticulous planning and the tools invented to achieve it elicit wonder.

Qazwini identifies writing as a noble art, brought into existence by God—*who taught by means of the pen, who taught man what he did not know* (Qur'an 96:4)—to preserve knowledge. Along with the craft of prosody, the patterns of rhythm and sound in poetry, scribes and artists have long explored the wonders of the written word in form, illumination, and illustration.

Man's coat (choga)

Kashmir, ca. 1803–56
Wool, metal-wrapped thread; double interlocking twill tapestry weave, applied decorative braid
The Metropolitan Museum of Art, Gift of George L. Cheney, 1924, 24.123

The choga, or open-fronted robe, is worn as an outer garment throughout Central and South Asia, North Africa, and Russia. The traditional handloom weave technique used to create the intricate design on this example is distinctive of textiles made in Kashmir, known for double-interlocking twill tapestry weave as well as the repeated *buta* (paisley) motif. This choga eventually ended up in Oman on the shoulders of Sayyid Saʿid, the sultan of Zanzibar and Oman (r. 1803–56).

Pouran Jinchi (Iranian American, b. 1959)

Untitled 13 (*Rubaiyat* series)

1996
Ink and acrylic on canvas
The San Diego Museum of Art, Museum purchase with funds provided by Sarah E. Aghassi, Nasrin Owsia & Behrooz Akbarnia, Gita Khadiri & Fred Khoroushi, Farnaz & Kourosh Mehrayin, Eugene "Mitch" Mitchell, and Mahsa Vahidi & Arman Paymai in honor of Ms. Shahri Estakhry, 2022.31

Featuring verses from the *Rubaiyat* (Quatrains) of Persian poet and polymath Omar Khayyam (d. 1131), this calligraphic painting reflects the brilliant interplay between word and image defining much of Pouran Jinchi's artistic practice. Here words are deconstructed, their letters broken down, reduced, and re-presented in a dynamic, abstract composition. The most recognizable among them is the letter *nun* ("noon"), or *n*, which consists of a circular *c*-shape with a rhomboid dot at its center.

The artist's script of choice is the cursive *nasta'liq*, developed in the fourteenth century and the finest of all Persian calligraphic scripts. Jinchi's training in traditional Persian calligraphy, her background as a mathematician, and her exposure to abstract expressionism in the United States contribute significantly to her practice. The artist is motivated by the challenge of enabling "a kind of storytelling," explaining that she tries "to communicate between the space where words are seen and visuals are experienced."

Fakhruddin al-Bursavi ("Fakhri," d. 1611)

Découpage album folio with Persian verses

Ottoman Türkiye, late 16th–early 17th century
Collection of Aydin Azizzadeh

The emergence of *muraqqaʿ* (album, Arabic for "patched") in Safavid Iran and the Ottoman Empire from the sixteenth well into the nineteenth centuries fostered a culture of connoisseurship evident in their popularity. Album making and collecting encouraged artistic techniques such as cutout calligraphy and paper marbling, both with roots in the fifteenth-century courts of the Timurid princes of Iran and Central Asia.

This folio showcases cutout calligraphy, also known as *qataʿa* (Arabic for "cutting out") or découpage. In this technique, the calligrapher replaces ink with words cut from a colored sheet of paper, then either pastes those letters onto a different-colored sheet, as seen here, or pastes the sheet with the letter-shaped holes onto a different-colored background. Works by the celebrated Ottoman calligrapher Fakhri, a master of the *nastaʿliq* script who often wrote (or cut) lines from Persian classical poetry, were enthusiastically collected by court and urban elites to be incorporated into albums.

Mishkin Qalam (d. 1912)

Album folio with Persian verses

Ottoman Palestine (modern Israel), Acre, 1895–96
Collection of Aydin Azizzadeh

Trained as a calligrapher, painter, and poet in Isfahan at the court of Nasir al-Din Shah Qajar (r. 1848–96) in Iran, Mishkin Qalam learned of Bahá'u'lláh (d. 1892), the Iranian prophet-founder of the Bahá'í faith, during travels to Aleppo, Syria. Although the Bahá'í faith has roots in Bábism, which itself stemmed in part from the Shiʿa branch of Islam, it is considered an independent world religion advocating the oneness of humanity under a single god, guided by the teachings of Bahá'u'lláh (Arabic for "Glory of God"). Mishkin Qalam was inspired to use his skills to copy important Bahá'í teachings, as seen in this folio containing Bahá'u'lláh's genealogy in a fine *nastaʿliq* script. The words are further embellished by the marbled margins of the outer folio.

Arts of the Book

The *kitabkhana* (royal workshop) was at the center of manuscript production and distribution in the Islamic world. A collective enterprise, manuscript making required the efforts of papermakers, paper burnishers, pigment grinders, scribes, calligraphers, illuminators, gilders, and other artisans. The *kitabkhana* director, an artist himself, planned projects once commissioned, determining their layout and assigning artisans. The paper was made from wood pulp, dried, decorated with gold leaf or marbling, and burnished in preparation for ink.

When the scribe completed the text, the book passed to the painters, with the composition drawn with a fine brush or copied from an existing design. Painters created their own pigments, often from costly minerals such as gold, silver, or lapis lazuli and used organic adhesives. Illuminators and gilders added chapter headings, border designs, frontispieces, and colophons (printers' emblems).

The pages were then sewn into a binding with a fore-edge flap tucked under the top cover. Leather bindings could also be tooled and decorated with designs modeled on drawings or stamped with ones created from molds; lacquer bindings replaced leather ones by the nineteenth century.

Writing Tools and Pen Boxes

Calligraphy holds great value in Islam for its connection to the Qur'an and a hadith of the Prophet Muhammad stated God's first creation was the pen (*qalam*), which recorded all existence onto a safely preserved tablet (*lawh*). By extension, calligraphers were held in high esteem.

Writing pens were made from reeds, with nibs that could be cut at different angles to determine the thickness of letters and to control ink flow. Pen boxes (*qalamdan*) that housed these humble pens along with sharpeners, scissors, and other tools are often highly embellished. In eighteenth- and nineteenth-century Iran, artists painted on papier-mâché pen boxes; these were covered with a layer of resin varnish that has darkened over time, giving the surfaces a deep and lustrous finish. Their fine decoration attests to the care with which the instruments themselves were prepared and kept.

These objects represent the range of imagery with which artists experimented at the Qajar and Zand courts of Iran, including shaded drawings, the rose-and-nightingale theme, figural scenes, and works in a Europeanizing style.

Muhammad Sadiq

Pen box (*qalamdan*) with European figures and landscapes

Iran, dated 1182 AH (1768–69)
Ink, opaque watercolor, and lacquer on papier-mâché
The San Diego Museum of Art, Museum Acquisitions Fund, 2014.18.a-b

Fathullah Shirazi

Pen box (*qalamdan*) with grisaille birds and flowers

Iran, ca. 1850
Ink, opaque watercolor, and lacquer on papier-mâché
The San Diego Museum of Art, Museum Acquisitions Fund, 2014.17.a-b

Pen box (*qalamdan*) with calligrapher's tools

Iran, 19th century
Papier-mâché, wood, metal, pigment, and lacquer
Islamic Arts Museum Malaysia, 2014.6.38

Calligrapher or bookbinder's tool

Ottoman Türkiye, 19th century
Iron with gold overlay
Islamic Arts Museum Malaysia, 2018.8.11

Bookbinding with a sylvan scene

Probably Iran, Qazvin, 1550–1600
Gilded and tooled leather binding
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 3 L

Bookbinding with animals and mythical creatures

Manuscript of the *Golestan* (Rose garden) of Saʿdi
Khurasan, probably Herat (Afghanistan), 16th century
Ink, watercolor, and gold on paper; restored lacquer binding,
leather doublures with tooled and gilded elements
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 46 MS

Tiraz fragment

Egypt, 11th century
Linen with tapestry weave
The al-Sabah Collection, Dar al-Athar al-Islamiyyah, Kuwait, LNS 208 T

Derived from the Persian word for embroidery, *tiraz* refers to inscribed embroidered textiles from the early Islamic period, produced both at court and in public factories, and often offered by rulers as robes of honor for courtiers or foreign ambassadors.

This fragment features a woven band of floriated Kufic inscription characteristic of those produced in Egypt under the Fatimid dynasty (909–1171). The specimen's linen medium and design suggest that it was intended for the general public as opposed to examples in silk, made as robes and woven with gold, which were reserved for high-ranking officials.

Octagonal Qur'an manuscript in *ghubarí* script

Iran, 889 AH (1484)
Ink, opaque watercolor, and gold on paper; leather binding
Brooklyn Museum, Gift of Laurice M. Khouri in memory
of her father, Alexander N. Khouri, 1992.230

Miniature Qur'an manuscripts such as this example executed in *ghubari* (dust-like) script were used as portable amulets, serving talismanic as well as devotional purposes. Its fine calligraphy and illumination suggest an elite commission. Stamps and marginalia trace its journey through the hands of several different owners across Iran and later the Ottoman Empire, where such Qur'ans, often attached to the shafts of military standards carried into battle by the *sancakdar* (standard-bearers), were known as *sancak* (banner).

THE BUILT ENVIRONMENT

The art of building, which provides human shelter, is praised as one of the major crafts in *Wonders and Rarities*. Ironmongery and carpentry, needed to make tools, roofs, and doors, are closely related. Qazwini describes wondrous objects made by carpenters, such as the divinely inspired Noah's Ark and automata that demonstrate technological innovations, like the wheel devised to draw water or the cupbearer's chest that cleverly pours wine.

Essential to the practice of these crafts is mathematics, the mastery of which Qazwini proposes will allow humanity to see wonder in all things. These works represent the knowledge and crafts related to the built environment designed to offer protection as well as joy. As Qazwini observes, "Any time you look upon a fine building, your heart is filled with happiness."

Attributed to Muhammad ibn Hamid al-Asturlabi al-Isfahani

Combination lock box

Iran, 593 AH (1197)
Leaded brass over wood; inlaid with copper, silver,
and gold; applied gilt brass figures
Museum of Fine Arts, Boston, Gift of Mrs. Edward Jackson Holmes, 55.1113

This strong box with a combination lock was produced by Muhammad ibn Hamid who was also an astrolabe maker; four astrolabes signed by him are known today. The lock is a slightly simpler version of a type described in *Kitab fi Maʿrifat al-hiyal al-handasiya* (The book of knowledge of ingenious mechanical devices) by the polymath and inventor Ismaʿil ibn al-Razazz al-Jazari, pages from which are displayed nearby. Al-Jazari and Muhammad ibn Hamid were contemporaries. The four dials operating the combination lock are on top of the lid, and when properly aligned comprise an eight-letter code that opens the box. Portions of the sides and bottom of the box are modern reconstructions, but the three figures on the front might be part of the original. If they are genuine, they might represent guards watching over whatever precious objects were kept inside the box.

Muhammad ibn Ahmad al-Izmiri (scribe)

A Peacock Basin

Folio from a manuscript of *Kitab fi Maʿrifat al-hiyal al-handasiya*
(The book of knowledge of ingenious mechanical devices)
Egypt, Cairo, Safar 755 AH (February 1354)
Ink, opaque watercolor, and gold on paper
Museum of Fine Arts, Boston, Hervey Edward Wetzel Fund, 22.1

In the early thirteenth century, the Muslim polymath and inventor Ismaʿil ibn al-Razazz al-Jazari wrote a treatise on automated devices. Copies of the text, which served as a source for Qazwini's cosmography, featured elaborate illustrations to accompany descriptions of mechanical apparatuses and automata such as clocks, locks, measuring instruments, and the peacock-shaped handwashing basin depicted on this folio from a well-known copy of the treatise.

A servant fills the automaton with water through plugs in the peacock's tail; the beak functions as a faucet to pour water into the basin, where it drains through a hole in the base into a pair of chambers with floating devices below. As the water level rises in the first chamber, it lifts the lever attached to the first floating device, which in turn pushes out a figure with soap in hand; the second floating device controls another figure, not shown here, who appears with a towel. A spigot at the bottom releases the water. Speculations surrounding the context for such a device include handwashing at banqueting tables or ritual ablution.

Muhammad ibn Ahmad al-Izmiri (scribe)

Device for Raising Water

Folio from a manuscript of *Kitab fi Maʿrifat al-hiyal al-handasiya*
(The book of knowledge of ingenious mechanical devices)
Egypt, Cairo, Safar 755 AH (February 1354)
Ink and opaque watercolor on paper
Museum of Fine Arts, Boston, Museum purchase with funds from the
Francis Bartlett Donation of 1912 and by contribution, 14.534

Among automata mentioned in the cosmography's Persian edition is a water-raising device, described in the chapter on carpentry. Qazwini would have been aware of al-Jazari's description, illustrated here on another folio from the 1354 copy of the latter's treatise on automated devices produced for a Mamluk ruler. This donkey-powered water wheel features in the text's chapter on water-raising machines. As the donkey circumambulates a vertical pole using the lever attached to its neck, the pole rotates and turns the cogged wheels below, which raises ladles carrying water at regular intervals. The illustration reveals some of the internal mechanics normally obscured from view.

Jalí screen

India, early 17th century
Sandstone
The San Diego Museum of Art, Museum purchase, 1998.105

*Jali*s, or pierced stone screens, were used extensively in Mughal Indian architecture as windows, room dividers, and railings. Skilled stonemasons carved the screens in a variety of zigzagging patterns and interlocking geometric designs. In the course of the day, the movement of their patterns in silhouette across the floor would animate their intricate geometry, enhancing the experience of the viewer while providing ventilation and privacy.

Based on the form of its pattern, this screen is dated to the reign of the Mughal emperor Jahangir (r. 1605–27), but the tradition of fine craftsmanship in the production of *jali*s continued into the early twentieth century as older monuments were renewed and repaired.

Muqarnas tile

Western Central Asia, late 14th century
Stonepaste; molded with a turquoise glaze
Islamic Arts Museum Malaysia, 2009.9.26

This three-dimensional form with a pointed arch-shape projection is known as a *muqarnas* niche. One of the most distinctive forms of Islamic architectural decoration, *muqarnas* adorned portals, vaults, and domes; its earliest surviving traces can be found on eleventh-century buildings in Central Asia, Iran, Iraq, Egypt, and North Africa. This ceramic example, glazed in turquoise and carved with interlacing vegetal designs, resembles similar tiles found in funerary complexes in Samarqand, Uzbekistan. It would have been combined with others in a larger architectural ensemble to produce a stunning visual display.

Mihrab-shaped panel

Iran, ca. 1350
Limestone; carved and engraved
Asian Art Museum, Gift of the Connoisseurs' Council, 2015.71

Intricately carved in stone and combining geometric, vegetal, and epigraphic designs with *muqarnas* decoration, this panel may have once served as a mihrab, a niche in the wall of a mosque that indicates the direction of prayer toward Mecca.

A double-band inscription framing the pointed arch contains the Qur'an's iconic Throne Verse (*Ayat al-Kursi*, 2:255), which declares God's majesty and protection. Another inscription executed in square Kufic script under a hanging mosque lamp contains praises to God, while a third along the top of the panel offers blessings to the Prophet. The lamp symbolizes divine light, literally visualizing the Qur'anic verses that identify God as the light of the heavens and the earth, and the likeness of His light as a niche containing a lamp (24:35).

Monir Shahroudy Farmanfarmaian (Iranian, 1922–2019)

Muqarnas One

2012
Mirror, reverse painted glass, acrylic, and plaster on wood
Courtesy the estate of the artist and Haines Gallery

Monir Farmanfarmaian's kaleidoscopic composition of mirror fragments and reverse-painted glass is grounded in the geometric principles of Islamic architecture and Persianate craft traditions. The artist applied the Persian mosaic technique of *aynakari* (mirror working), by which tiny, hand-cut pieces of mirror are arranged in geometric patterns to embellish buildings or objects, to the three-dimensional patterns of *muqarnas* decoration. Fusing centuries-old decorative elements found in the interior spaces of mosques and shrines, this stunning sculptural work plays with light and challenges visual boundaries.

Timo Nasseri (German Iranian, b. 1972)
One and One #51

2023
White ink on pigmented paper
LAMMA Collection, London

Fascinated by the mathematics behind *muqarnas*, Timo Nasseri sought answers to his own questions by studying this decorative art form on buildings in Iran. The *One and One* series represents the artist's attempts to recreate its intricate three-dimensional geometric designs in white ink on black paper. Nasseri refers to the "flattening" of *muqarnas* to reveal its algorithms and the beauty of its different formations.

Door

Spain, probably Granada, 14th century
Cedar, wood, polychrome, and gilding
Hispanic Society of America, D70

The complex design of this door is derived from the geometric configuration known as the *lazo* of eight, whereby two overlapping squares rotated at forty-five degrees from each other create eight-pointed stars. Arabic joinery techniques enable the panels of polygons, which radiate from the central stars and frame the design, to interlock like puzzle pieces without the need for fixtures while also leaving room for movement to avoid warping. Each panel was enhanced with delicately carved vegetal motifs, some of which bear traces of pigment.

The door's decoration and joinery technique are particularly characteristic of medieval Islamic woodwork across Egypt, North Africa, and Spain, where it remained popular with rulers of the Nasrid dynasty (1232–1492). Arabic joinery remains a living tradition in Islamic countries such as Egypt, though the need to preserve its knowledge has become increasingly urgent.

Hassan Abou Zeid (Egyptian, b. 1952)

Panel with Mamluk joinery design replicating part of a minbar (Qaytbay, Cairo)

2018
Cow bones, wood (walnut and pitch pine)
Loaned by the Egyptian Heritage Rescue Foundation

This panel replicates a section from the *minbar*, or pulpit, commissioned in 1474 by the Mamluk Sultan al-Ashraf Qaytbay (r. 1468–96) for his funerary mosque in Cairo's Northern Cemetery. The original *minbar* displays a mastery of wood craftsmanship with hundreds of pieces intricately cut and inlaid with carved ivory to create a magnificent, interlocking geometric design. This unique joinery technique is known in Arabic as *ʿashiq wa masʿshuq*, or "lover and beloved," as the pieces are designed and carved to fit perfectly together without the use of nails or glue.

The panel is part of the Egyptian Heritage Rescue Foundation's (EHRF) effort to preserve the artistic traditions behind Cairo's medieval Islamic architecture, in which local craftspeople were commissioned to record, restore, and recreate medieval minbars. The EHRF hopes to call attention to both the ingenuity of these traditions and the urgent need for their preservation in light of their few living practitioners.

Elevation of the Qaytbay minbar. Madrasa, and Mosque of Qaytbay, Northern Cemetery, Cairo. Photo: Omniya Abel Barr, 2024.

The Qaytbay minbar in situ. Minbar, Madrasa, and Mosque of Qaytbay, Northern Cemetery, Cairo. Photo: Omniya Abel Barr, 2024.

Craftspeople at the Egyptian Heritage Rescue Foundation (left to right): Abdelrahman Abulfadl, Wael Hanafi, and Hassan Abou Zeid. Photo: Omniya Abel Barr, 2024.