

Warps & Wefts 2009

"God is beautiful and loves beauty." —Saying of the Prophet Muhammad, according to Muslim

Gregorian and Hijri Calendars

Warps & Wefts 2009

The interlacing of warp and weft defines a woven fabric. The weaver strings warp yarns onto a loom, a frame designed to hold the warps parallel and taut, and then introduces the wefts sequentially. The process is weaving; the result is a textile.

When we think of textiles, we most often think of garments to clothe our bodies and furnishings to supply our domestic needs. But throughout history, textiles have also played a primary role in fashion, drawing on not only color and pattern but also draping qualities and the effects of tailoring to cover (or show off) the body. As furnishings, textiles serve as covers and as hangings, to cover tables and to decorate floors. In architecture, fabric is used for tents and as wall dividers, sunshades and even fences. In traditional societies where trees and paper are scarce, textiles store and transport belongings as well as grains, flour, salt and other commodities. For animal management, textiles are tethers, saddlecloths, coverings and girth straps, as well as ropes and cords.

With such diversity in their forms and functions, textiles convey massive amounts of information about cultures and economies. Representing sophisticated understandings of materials and their physical properties, as well as technologies for their manipulation, textiles embody human ingenuity. Because they have been traded far and wide, to study textiles is to learn about the world.

Textiles created in Islamic societies before the industrial revolution represented the most advanced stages of technological development for their time. Less than a century after the Arab conquests, patterned silks woven with compound weave structures were exported beyond Islamic lands to the East and West. Although silk is first documented in China, luxury Islamic textiles subsequently influenced silk-weaving in China and Japan, and pattern-woven fragments of Islamic silks were used to wrap the relics of saints in European church treasuries. These rich textiles were produced using the technology of the drawloom, whose two separate harnesses allowed for two sets of warps, one for pattern and one for structure, and which likely contributed to the rapid commercialization of textile production and trade from the early Islamic period. The Islamic influence on textiles endures in English terms in use today: *damask* from Damascus; *muslin* from Mosul; *ikat* from the Arabic root *agade* ("to knot or tie");

cotton from Arabic *al-qutun*; and *crimson* from *kermez*, an insect-based dye. *Taffeta* and *shawl* are Persian words. From India, which traded with Safavid Iran, Ottoman Turkey and an emergent Europe, we have *calico* from Calcutta and *chintz* from Chit. *Paisley* is a town in Scotland where weavers wove patterns derived from the shawls of Kashmir.

To appreciate how textiles informed early Islamic societies, consider technologies associated with the cultivation of cotton and linen, animal husbandry and the production of wool, and the human intervention in the metamorphosis of the caterpillar to produce silk. Once the yarn or thread is produced, other textile technologies come into play, from the warps and wefts of weaving to the surface design techniques of dyeing, resist-dyeing, printing and embroidery, all of which reached great heights in Islamic cultures. Ikat is a resist-dyeing technique, applied not to the cloth but to the yarn before it is woven; knitting and crocheting depend on single elements or sets of elements and are not woven. Appliqué and quilting rely on the manipulation of cut cloth after weaving.

In weaving at the loom, the warp must first be stretched and secured. Only then can the fixed warp yarns interlace with the sequential weft yarns. The length and placement of these yarns determines the length and width of the textile. The simplest weave structure is called *plain weave*, in which the sequence of interlacing of warp and weft is "over one, under one": Taffeta is an example of a plain weave. Tapestry is also a plain-weave structure, but it uses discontinuous wefts to create design. A *twill* weave exhibits a regular interlacing sequence of "over two [or three], under one," in progressive fashion. Satin weave has a regular interlacing sequence of "over four [or more], under one." Supplementary discontinuous wefts, sometimes called brocading wefts, may add any combination of color, dimension and pattern to a foundation of plain weave, twill or satin. More complex weave structures such as satin lampas and velvet result from still other sequences in the interlacing of warp and



WRITTEN BY CAROL BIER

weft, and from the introduction of supplementary or complementary warps or wefts. The most technically complex weaves are the velvets, which rely upon supple-

mentary warps to form the pile by pulling loops into the fabric; the loops may be cut after weaving or left uncut. In Safavid Iran, velvets were especially colorful because weavers had figured out how to substitute different colors into the pile warps, but these exceptional velvets proved to be so labor-intensive that they were not economically viable.

Weave structure is but one way to classify textiles. Looms offer another. A horizontal ground loom was favored by nomadic pastoralists. This type of loom is generally no wider than a woman's arm span, and is secured into the ground with stakes that can be removed for transport. A tripod support above the loom creates a *shed* through which the weft is passed; this enables the manipulation of alternate warp varns. A wider version of the horizontal ground loom may be worked by several women at once for weaving either kilims or pile rugs. A vertical loom, with elements similar to those of the horizontal ground loom, is common in village homes and city workshops throughout the Middle East and Central Asia. A variation of this loom type has a rolling beam, which allows for weaving on a warp that is longer than the vertical loom is tall; this type of loom is particularly useful in commercial establishments. A more complicated type of loom is the drawloom, which is best suited to weaving intricate patterns and complex fabric structures such as lampas and velvet. Draw harnesses and treadles, operated by a drawboy, enable the weaver to manipulate warp yarns to bring wefts to the surface as necessary, creating complicated designs and patterns. Many textiles of the early Islamic period required drawloom technology to achieve the complexity of their weave structures and patterns, and the drawloom is the antecedent of the mechanized looms of the industrial age.

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Cover: Interlocking medallion and arabesque patterns are writ large in the appliqué wall panels of a ceremonial tent in Cairo. Such a tent might shelter a large wedding, a community *iftar* meal or an institutional celebration. Drawing from the design history of both architecture and carpets, each uniquely patterned panel is cartooned, cut and hand-stitched to create a monumental textile. Photo: Caroline Penn / Impact Photos / Alamy. Above: The Album of Kashmiri Trades depicted mid-19th-century "shawl-weavers." Photo: British Library / Bridgeman Art Library.

Patterns of Moon, Patterns of Sun

WRITTEN BY PAUL LUNDE

The *hijri* calendar

In AD 638, six years after the death of the Prophet Muhammad, Islam's second caliph 'Umar recognized the necessity of a calendar to govern the affairs of the Muslims. This was first of all a practical matter. Correspondence with military and civilian officials in the newly conquered lands had to be dated. But Persia used a different calendar from Syria, where the caliphate was based; Egypt used yet another. Each of these calendars had a different starting point, or epoch. The Sasanids, the ruling dynasty of Persia, used June 16, AD 632, the date of the accession of the last Sasanid monarch, Yazdagird III. Syria, which until the Muslim conquest was part of the Byzantine Empire, used a form of the Roman "Julian" calendar, with an epoch of October 1. 312 BC. Egypt used the Coptic calendar, with an epoch of August 29, AD 284. Although all were solar, and hence geared to the seasons and containing 365 days, each also had a different system for periodically adding days to compensate for the fact that the true length of the solar year is not 365 but 365.2422 days.

In pre-Islamic Arabia, various other systems of measuring time had been used. In South Arabia, some calendars apparently were lunar, while others were lunisolar, using months based on the phases of the moon but intercalating days outside the lunar cycle to synchronize the calendar with the seasons. On the eve of Islam, the Himyarites appear to have used a calendar based on the Julian form, but with an epoch of 110 BC. In central Arabia, the course of the year was charted by the position of the stars relative to the horizon at sunset or sunrise, dividing the ecliptic into 28 equal parts corresponding to the location of the moon on each successive night of the month. The names of the months in that calendar have continued in the Islamic calendar to this day and would seem to indicate that, before Islam, some sort of lunisolar calendar was in use, though it is not known to have had an epoch other than memorable local events.

There were two other reasons 'Umar rejected existing solar calendars. The Qur'an, in Chapter 10, Verse 5, states that time should be reckoned by the moon. Not only that, calendars used by the Persians, Syrians and Egyptians were identified with other religions and cultures. He therefore decided to create a calendar specifically for the Muslim community. It would be lunar, and it would have 12 months, each with 29 or 30 days. This gives the lunar year 354 days, 11 days fewer than the solar year. 'Umar chose as the epoch for the new Muslim calendar the *hijrah*, the emigration of the Prophet Muhammad and 70 Muslims from Makkah to Madinah, where Muslims first attained religious and political autonomy. The *hijrah* thus occurred on 1 Muharram 1 according to the Islamic calendar, which was named "*hijri*" after its epoch.

(This date corresponds to July 16, AD 622 on the Gregorian calendar.) Today in the West, it is customary, when writing *hijri* dates, to use the abbreviation AH, which stands for the Latin *anno hegirae*, "year of the *hijrah*."

Because the Islamic lunar calendar is 11 days shorter than the solar, it is therefore not synchronized to the seasons. Its festivals, which fall on the same days of the same lunar months each year, make the round of the sea-

sons every 33 solar years. This 11-day difference between the lunar and the solar year accounts for the difficulty of converting dates from one system to the other.

The Gregorian calendar

The early calendar of the Roman Empire was lunisolar, containing 355 days divided into 12 months beginning on January 1. To keep it more or less in accord with the actual solar year, a month was added every two years. The system for doing so was complex, and cumulative errors gradually misaligned it with the seasons. By 46 BC, it was some three months out of alignment, and Julius Caesar oversaw its reform. Consulting Greek astronomers in Alexandria, he created a solar calendar in which one day was added to

It is he who made the sun to be a shining glory, and the moon to be a light (of beauty), and measured out stages for her, that ye might know the number of years and the count (of time). —The Qur'an, Chapter 10 ("Yunus") Verse 5

February every fourth year, effectively compensating for the solar year's length of 365.2422 days. This Julian calendar was used throughout Europe until AD 1582.

In the Middle Ages, the Christian liturgical calendar was grafted onto the Julian one, and the computation of lunar festivals like Easter, which falls on the first Sunday after the first full moon after the spring equinox, exercised some of

> the best minds in Christendom. The use of the epoch AD 1 dates from the sixth century, but did not become common until the 10th. Because the zero had not yet reached the West from Islamic lands, a year was lost between 1 BC and AD 1.

> The Julian year was nonetheless 11 minutes and 14 seconds too long. By the early 16th century, due to the accumulated error, the spring equinox was falling on March 11 rather than

where it should, on March 21. Copernicus, Christophorus Clavius and the physician Aloysius Lilius provided the calculations, and in 1582 Pope Gregory XIII ordered that Thursday, October 4, 1582 would be followed by Friday, October 15, 1582. Most Catholic countries accepted the new "Gregorian" calendar, but it was not adopted in England and the Americas until the 18th century. Its use is now almost universal worldwide. The Gregorian year is nonetheless 25.96 seconds ahead of the solar year, which by the year 4909 will add up to an extra day. @

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Converting Dates

The following equations convert roughly from Gregorian to *hijri* and vice versa. However, the results can be slightly misleading: They tell you only the year in which the other calendar's year *begins*. For example, though the equation tells you that 2009 "equals" AH 1430, in fact 2009 includes the first days of 1431.

Gregorian year = $[(32 \times Hijri \text{ year}) \div 33] + 622$

Hijri year = [(Gregorian year - 622) x 33] \div 32

Alternatively, there are more precise calculators available on the Internet: Try www.rabiah.com/convert/ and www.ori.unizh.ch/hegira.html.

Though they share 12 lunar cycles—months—per solar year, the *hijri* calendar uses actual moon phases to mark them, whereas the Gregorian calendar adjusts its nearly lunar months to synchronize with the sun.



Saudi Aramco WOLD 2009

One of the world's greatest masterpiece pile carpets—some experts call it the greatest of all—is the "Ardabil carpet," woven in the 16th century in Safavid Iran and measuring 10.5 by 5.3 meters (34½' x 17½'). This detail shows its 16-point central medallion surrounded by floral arabesques, designs formed by more than 50 *sehna* knots (see drawing at right) per square centimeter (300 per sq in), in 10 colors of wool, set on warps and wefts of silk—an estimated 28 *million* knots. Photo: V&A Images.



JANUARY

MUHARRAM – SAFAR 1430

FEBRUARY

SAFAR-RABI' | 1430

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
					1 4	2 5
		_		_		
3 6	4 7	5 8	6 9	10	8 11	9 12
10	11	12	13	14	15	16
13	14	15	16	17	18	19
17	10	10	20	21	22	22
20	18 21	22	20 23	2 1 24	22 25	23 26
24	25	26	27	28	29	30
27	28	29	1	2	3	4
31 5						

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
	1	2	3	4	5	6
	6	7	8	9	10	11
7	8	9	10	11	12	13
12	13	14	15	16	17	18
14	15	16	17	18	19	20
19	20	21	22	23	24	25
21	22	23	24	25	26	27
26	27	28	29	30	1	2
28 3						





Often woven on ground looms using multiple wefts in a variety of slit-tapestry techniques (see drawing), tribal patterns of Anatolian *kilim*s are known for their bold colors and graphic designs. This detail shows the full width of a kilim measuring 1.5 by 4.1 meters (5'1" x 13'6") and woven in the late 19th century in Malatya, in south-central Turkey. Photo: Marla Mallett (www.marlamallett.com).



MARCH RABI' I - RABI' II 1430

Saturday

24

Sunday

5

APRIL	
	1

RABI' II – JUMADA I 1430

Friday

7

21

28

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday
	3 6	4 7	5 8	6 9					1 5	2 6
2	10 13	11 14	12 15	13 16	4 8	5 9	6 10	7 11	8 12	9 13
9	17 20	18 21	19 22	20 23	11 15	12 16 Easter	13 17	14 18	15 19	16 20
23 26	24 27	25 28	26 29	27 30	18 22	19 23	20 24	21 25	22 26	23 27
60	31 4				25 29	26 1	27 2	28 3	29 4	30 5



Saudi Aramco 2009

Suzani is a needlework tradition that reached its highest expression among urban peoples of Central Asia. It uses a technique also used by nomadic people of the region, but the design repertory is quite different. Executed with a needle on a base fabric of cotton or linen, this especially vibrant suzani from 19th-century Uzbekistan shows a design based on the *palak* roundel, associated with the ancient symbolism of sun and moon. Photo: Vanni / Art Resource.

MAY

JUMADA I – JUMADA II 1430

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
						1 6
2 7	3 8	4 9	5 10	6 11	7 12	8 13
0	10	11	10	12	14	10
9 14	15	16	1 2 17	13 18	1 4 19	20
16 21	17 22	18 23	19 24	20 25	21 26	22 27
23 28	24 29	25 1	26 2	27 3	28 4	29 5
30 6	31 7					

JUNE JUMADA II – RAJAB 1430

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Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
		1	2	3	4	5
		8	9	10	11	12
6	7	8	9	10	11	12
13	14	15	16	17	18	19
13	1/	15	16	17	18	10
20	21	22	23	24	25	26
20	21	22	23	24	25	26
27	28	29	30	1	2	3
27	28	29	30			
4	C	0	1			



Saudi Aramco WOLD 2009

Slight irregularities in dye absorption and loom setup soften the color edges of an *ikat* pattern, produced using a technique based on resist-dying the warps prior to stretching them on the loom. Here, ikat silk warps are strung on a loom in Kashgar, western China. The word *ikat* comes from the Arabic *agade* ("to knot or tie"), and each color requires a separate set of bindings on the bundled warp yarns that resist other dyes. Photo: Keren Su / Getty Images.

JULY RAJAB—SHA'ABAN 1430

AUGUST

SHA'ABAN – RAMADAN 1430

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
				1	2	3
				8	9	10
4	5	6	7	8	9	10
11	12	13	14	15	16	17
11	12	13	14	15	16	17
18	19	20	21	22	23	24
18	19	20	21	22	23	24
25	26	27	28	29	1	2
25	26	27	28	29	30	31
3	4	5	6	7	8	9

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
1	2	3	4	5	6	7
10	11	12	13	14	15	16
8	9	10	11	12	13	14
17	18	19	20	21	22	23
15	16	17	18	19	20	21
24	25	26	27	28	29	30
22	23	24	25	26	27	28
1	2	3	4	5	6	7
29 8	30 9	31 10				



Saudi Aramco 2009

Kashmir shawls are typically large; this one, from the late 19th century, measures two meters square (6'6" sq). Its pattern is almost liquid in appearance; the designs are produced using a "double-interlocked" tapestry technique (see drawing) in which weft yarns of adjacent colors wrap around each other. The lozenge-like motifs are called *boteh*; they became popular in the West as "paisley" after they were imitated by weavers in Paisley, Scotland. Photo: Mrs. Jeffrey Patterson / Textile Museum.



SEPTEMBER

RAMADAN – SHAWWAL 1430

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
			1 11	2 12	3 13	4 14
5 15	6 16	7 17	8 18	9 19	10 20	11 21
12 22	13 23	14 24	15 25	16 26	17 27	18 28
19 29	20 1 'Id al-Fitr	21 2	22 3	23 4	24 5	25 6
26 7	27 8	28 9	29 10	30 11		

OCTOBER

SHAWWAL – DHU AL-QA'DAH 1430

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
					1 12	2 13
3 14	4 15	5 16	6 17	7 18	8 19	9 20
10 21	11 22	12 23	13 24	14 25	15 26	16 27
17 28	18 29	19 30	20 1	21 2	22 3	23 4
24 5	25 6	26 7	27 8	28 9	29 10	30 11
31 12						



Saudi Aramco 2009

Working in the second half of the 16th century, a highly skilled Ottoman weaver combined silk warps and wefts with additional metal-wrapped wefts to create compound weaves in which complicated repeat patterns were integral with the weave structure. In this undulating vegetal pattern, twill and satin weaves achieve different effects: By passing over only two or three warps, the twill interlacing permitted the rendition of detail; by passing over four or more warps, the satin interlacing (see drawing) smoothed the overall texture. Photo: Metropolitan Museum of Art / Art Resource.

NOVEMBER

DHU AL-QA'DAH — DHU AL-HIJJAH 1430

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
	1 13	2 14	3 15	4 16	5 17	6 18
7 19	8 20	9 21	10 22	11 23	12 24	13 25
14 26	15 27	16 28	17 29	18 1	19 2	20 3
21 4	22 5	23 6	24 7	25 8	26 9	27 10
28 11	29 12	30 13				ʻId al-Adha

DECEMBER

DHU AL-HIJJAH 1430 – MUHARRAM 1431

Saturday	Sunday	Monday	Tuesday	Wednesday	Thursday	Friday
			1	2	3	4
			14	15	16	17
F	6	7	0	0	10	11
5 18	0 19	20	o 21	9 77	10 23	24
		20			20	2 1
12	13	14	15	16	17	18
25	26	27	28	29	30	1
10	20	21	22	22	24	25
7	3	Z I 4	5	ZJ	Z4 7	25 8
						Christmas
26	27	28	29	30	31	
9	10	11	12	13	14	



n November 1949, the Arabian American Oil Company (Aramco) launched an interoffice newsletter named *Aramco World*. Over the next two decades, as the number of Americans working with Saudi colleagues in Dhahran grew into the tens of thousands, *Aramco World* grew into a bimonthly educational magazine whose historical, geographical and cultural articles helped the American employees and their families appreciate an unfamiliar land.

The magazine is now published by Aramco Services Company in Houston, Texas on behalf of Saudi Aramco, which succeeded Aramco in 1988 as the national oil company of Saudi Arabia. In 2000, *Aramco World* changed its name to *Saudi Aramco World* to reflect this relationship.

Today, *Saudi Aramco World's* orientation is still toward education, the fostering of cooperation and the building of mutual appreciation between East and West, but for the last four decades the magazine has been aimed primarily at readers outside the company, worldwide, as well as at internal readers. Its articles have spanned the Arab and Muslim worlds, past and present, with special attention to their connections with the cultures of the West. Subscriptions to *Saudi Aramco World* are available without charge to a limited number of readers. Multiple-copy subscriptions for seminars or classrooms are also available. Subscriptions may be requested at www.saudiaramcoworld.com

or as follows: From Saudi Arabia, send to Public Relations, Saudi Aramco, Box 5000, Dhahran 31311; from all other countries, send a signed and dated request by mail to *Saudi Aramco World*, P.O. Box 2106, Houston, Texas 77252, USA, by e-mail to saworld@aramcoservices.com or by fax to +1 (713) 432-5536.

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