ever since camels gradually fell into the service of people in the arid lands of Arabia, Africa and Asia about 4,000 years ago, they have evoked wonderment. Their domestication, late compared with other species, had a profound influence on the societies of these vast territories through the exchange of ideas and the interaction of languages as well as culture both intangible and material. They provided, for the first time, an effective means for long-distance overland travel for merchants and the seasonal migrations of tribes. By the coming of Islam in the seventh century CE, a complex network of trade and pilgrimage routes had developed that connected the far reaches of the known world.

The consequences were as significant then as those experienced more recently with the advent of the telegraph, the internal combustion engine and, most recently, the Internet.

There are two domesticated camel species, and they can be identified with ease. The one-humped species numbers some 27 million worldwide, making it by far the most populous. It has also the greatest variety of breeds, numbering at least 90. Known as the dromedary (*Camelus dromedarius*), it inhabits the hot desert lands of the Arabian Peninsula, Levant, North Africa and the Horn of Africa. The two-humped species, the Bactrian (*Camelus bactrianus*), numbers around three million. It populates the colder deserts and steppes of Central Asia with 14 recognized breeds.

The wild predecessors of both the dromedary and the Bactrian camels are extinct. Archaeologists and geneticists are now using ever-more-sophisticated technologies to unpick often scant and elusive evidence of the story of its evolutionary migration, domestication and ancestral species extinctions. Today the only surviving wild species of camel is the two-humped *Camelus ferus*, whose critically endangered population of about 1,000 lives mainly in the Gobi Desert.

Studies of all three species continue to reveal wonders of adaptation, characteristics and potential. Wild camels, for example, can drink slush with more salt in it than seawater. (They also appear to have been unaffected by decades of nuclear tests conducted in their now-protected habitat.) Milk from camels contains an insulin-like molecule, and it is replete with antibodies and enzymes. It lowers cholesterol in humans, and it can be consumed by people with allergies to cow’s milk. Studies are currently examining camel-milk immunoglobulins for cancer-fighting potential.

The camel's environmental adaptations include blood-temperature range not unlike that of reptiles, and this helps camels endure extreme temperatures. In addition, as dehydration thickens a camel’s blood, its red cells elongate, which enables them to flow con-

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**Camels and Culture**

**Written by Peter Harrigan**

**The Hijri Calendar**

In 638 CE, 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 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, 632 CE, 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 BCE. Egypt used the Coptic calendar, with an epoch of August 29, 284 CE. Although all were solar calendars, 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 BCE. In central Arabia, the course of the year was charted by the position of the stars, six years after the death of the Prophet Muhammad, Islam’s second caliph, ‘Umar, the Hijri, the emigration of the Prophet Muhammad and 70 Muslims from Makkah to Madinah, where Muslims first attained religious and political autonomy. Hijra thus occurred on 1 Muharram of the year 1 according to the Islamic calendar, which was named hijri after its epoch. (This date corresponds to July 16, 622 CE,
The camel hold water, the cells can expand to more than three times their original volume—far more than those of any other mammal. (This is what allows a camel to drink up to 120 liters in 10 minutes—more capacity than the fuel tank of a large utility vehicle, and not much more time in “refueling.”) As for its range capabilities, a watered camel can travel, with time for grazing, up to a week or more without water, and it can cover more than 600 kilometers.

The rider’s experience is also unique. Explorer and writer Eldon Rutter traveled on camelback in western and northern Arabia in 1926. During hot months, desert travel was often best during the cooler hours of darkness, and Rutter describes the mesmerizing experience with the patient camels pacing forward until dawn. “It seems to the rider borne at such a height aloft, that he is silently gliding or swimming over a yielding unstable surface,” he wrote in his acclaimed book, The Holy Cities of Arabia.

In contrast, much other Western literature has stereotyped dromedaries as either whimsical or aggressive and ill-tempered, whereas anyone who has come to know and work with them invariably regards them as intelligent, sociable and gentle.

These characteristics and qualities of the dromedary have been deeply known in Arab lands for thousands of years, where camels have been a major motif in Arabic poetry, stories, vocabulary, metaphors, proverbs and humor. Camels literally enabled the transmission of an oral tradition. Traditional poems often include a description and elaborate panegyric that describes the fine mount that brings the poet or storyteller to audiences far and wide.

Today the dromedary is increasingly celebrated throughout the region for this cultural legacy, and for providing such a rich, productive and symbiotic relationship with its herders, breeders and keepers.

Globally, the camel population today accounts for fewer than one percent of domesticated herbivores. (Cows and cattle number two billion.) It is in the arid lands of Africa—and particularly in the Horn of Africa—that camel populations are highest and rising, as they are bred and tended as valuable, sustainable sources of food and materials: Estimates cite as many as 20 million, or roughly 80 percent of the dromedary population worldwide. The Arabian Peninsula has a dromedary population of around 1.5 million, and scientists in Saudi Arabia and the United Arab Emirates are spearheading a growing field of research.

With its adaptability highly suited to face today’s emerging challenges of climate change, says Bernard Faye, a camel expert with the Food and Agriculture Organization of the United Nations, camels “represent a fabulous biological model for scientists from different disciplines.” He argues that the camel’s place in the world deserves to be re-evaluated in light of trends and potential, including the qualities of their milk and meat, as well as the promise of new derivative products. Little wonder, Faye contends, that no other domesticated animal has offered humans so much utility, pleasure and value.

Peter Harrigan is a contributing editor and senior writer for AramcoWorld as well as founder and editorial director of Medina Publishing.

On the cover: “I like how the expression of the camel suggests pride and a hint of a smile,” says photographer Marin Tomic, who came eye to eye with this dromedary during a jeep tour in Dubai.

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

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 1 CE dates from the sixth century, but did not become common until the 10th.

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.

The late Paul Lunde was a senior research associate with the Civilizations in Contact Project at Cambridge University and author of more than 70 articles for AramcoWorld.

CONVERTING YEARS AND 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, 2019 Gregorian begins in Rabi’ I, the fourth month of hijri 1440, and ends in Jumada I, the fifth month of hijri 1441.

\[
\text{Gregorian year } = \frac{[32 \times \text{Hijri year} + 33]}{32} + 622
\]

\[
\text{Hijri year } = \frac{[\text{Gregorian year} - 622] \times 33}{32}
\]

Online calculators can be found by searching “Gregorian-hijri calendar calculator” or similar terms.
Desert travelers outside of Douz, Tunisia, 1969. While camels have been in use in the Arabian Peninsula for several thousand years, they did not come into systematic use in North Africa until the early centuries CE. The great network of trans-Saharan camel-caravan routes flourished from the early Islamic era, in the seventh and eighth centuries, through Ottoman times, until the 19th century.
Alongside a Bactrian camel, girls wrap themselves against winter’s cold in the Afghan Pamir mountains. Among nomadic and semi-nomadic people in high regions of Central Asia, yaks are often used as well as camels for carrying. These girls are using their camel to carry drinking water for their family. More than one-humped dromedaries, two-humped Bactrian camels can endure extremes of both heat and cold.

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Mamduah Ibrahim al-Rasheedi stands before one of the scores of petroglyph-covered stone faces in the remote desert near Shuwaymas, in the Ha'il region of Saudi Arabia. This wall shows camels large and small, pecked, chiseled and scraped into the rock by Neolithic artisans. Other friezes depict other animals as well as people. Al-Rasheedi, a school superintendent in the region, learned about the friezes from Bedouin in 2001 and helped bring their existence to the attention of antiquities authorities.
For his pioneering photographic study "Animal Locomotion," shot between 1884 and 1887, British photographer, cinematographer and inventor Eadweard Muybridge used tripwires and multiple cameras to capture phases of motion. Camels were among the many animals—and humans—he documented. His work advanced studies of physiology and biomechanics.

Photos by EADWEARD MUYBRIDGE / PRIVATE COLLECTION / STAPLETON COLLECTION / BRIDGEMAN IMAGES

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Made by Turkmen seamstresses to caparison the lead camel in a bridal procession, this düye başlyk uses bright patchwork sewn in patterns and ribbons that, according to folk beliefs, help bring good luck and ward off the evil eye.

Image courtesy
SUSAN MELLER
Reprinted from Silk and Cotton: Textiles from the Central Asia that Was, by Susan Meller (Abrams, 2013)
A camel ride along the beach at sunset is a daily tourism event in Broome, Australia. Camels were first brought to Australia in the 19th century to support construction in the central and western part of the country. Replaced by motor vehicles in the early 20th century, the camels were set loose in the Outback, where they proliferated. Now they number about 300,000.
Ten days into their 30-day, 1,250-kilometer journey from Daraw, in northwest Sudan, to Dongola, Egypt, herders move their stock along the 600-year-old darb al-arba’in, or Forty Days’ Road, one of the most historic trade routes in Africa. Today the herds are smaller, the route is shorter and, rather than bearing the commodities of trade on their backs, the camels themselves are the commodity. But the herder’s lot has not much changed: hot days, cold nights and an unforgiving desert.
Around the world, countries have used postage-stamp designs to highlight history and culture. The stamps here represent a sample of all those that have—in as many different ways as there are countries to produce them—depicted camels.

### Images courtesy

**UNIVERSAL POSTAL UNION AND ALAMY**

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- Republic of Upper Volta renamed Burkina Faso 1984
- Druze Prince Fakhr al-Din Ma’n born on Mount Lebanon 1572
- Senegal declares independence 1960
- Michael Eidson invents CamelBak hydration 1989
- Sitar virtuoso Vilayet Khan born 1928
- ‘Abd al-Rahman lands in Iberia 755
- ‘Abd al-Rahman i born 1892
- Indonesia proclaims independence 1945
- Caliph Omar begins reign 634
- Premiere of Wadjda, first commercial feature film by a Saudi woman, 2012

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Bedouin men walk camels in Marsa Alam, Egypt, on the coast of the Red Sea, where camels today mainly service tourism, from short rides to desert safaris.
Shaved, cut and dyed in designs that can take as long as three years to produce, camels show what some of the world’s top camel-fur-cutting artisans can offer at the annual Bikaner Camel Festival in Rajasthan, India, where they are joined by thousands of spectators. Other events of the two-day fair include camel dancing, camel decorating and cultural performances.
This detail of a large painting produced around 1853 by Ali, an artist in the royal court of Maharaja Takhat Singh of Jodhpur, India, shows the women of the court riding camels for a hunt in the desert countryside.

NOTES:
Not far from where the dromedary was first domesticated 3,000 to 4,000 years ago in the southern Arabian Peninsula, a newborn calf and mother bond in a sandy expanse in Oman. The calf will nurse for 12 to 18 months, and around age seven it will be full grown.

Photo by AJANSEN / ISTOCK
In November 1949 the Arabian American Oil Company (Aramco) published the first issue of an interoffice newsletter named Aramco World. Over the decades that followed, 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 those employees and their families appreciate an unfamiliar land.

Today Aramco World continues to be published in digital and print editions by Aramco Services Company in Houston, Texas, on behalf of Saudi Aramco, since 1988 the national energy company of Saudi Arabia.

Our mission remains education, the fostering of cooperation and the building of mutual appreciation among the increasingly interconnected cultures of East and West.

All back issues are searchable and downloadable without charge, and selected photographs from past issues are also available at photoarchive.saudiaramcoworld.com.

Subscriptions to our biweekly email newsletter and our bimonthly print edition are both available without charge to a limited number of readers worldwide at aramcoworld.com

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