The Domestication of Camel in the Literary, Archaeological and Petroglyph Records

Renato Sala *

Abstract: The domestication of camels happened at the start of the III millennium BC in their natural habitats, for the dromedary in SE-Arabia, for the Bactrian camel in SW-Central Asia. Three steps of camel domestication and use are distinguished: for harvesting its body products, as transport animal (drafted, loaded, and ridden), as military animal. With the start of the I millennium BC the introduction of new saddle types and of hybridization techniques promoted, in all the arid expanses of Afro-Eurasia, the growing superiority of the loaded camel over wheels and draft transports, and of camelry over cavalry.

Key Words: Camel, domestication.

1. Introduction

The name ‘camel’ refers to the Camelidae of the old world, i.e. to the camelinini tribe, represented today by 3 species: the wild Bactrian camel (Camelus ferus); its descendant, the domesticated Bactrian camel (Camelus bactrianus, also called Asian camel); and the domesticated dromedary camel (Camelus dromedarius, also called Arabian or Indian camel), of which the wild ancestor went extinct during the I millennium BC.

The domestication of the Arabian and Bactrian camels happened more or less synchronously at the turn of the III millennium BC: 5000 years after the bull, 2000 after the donkey. It occurred in the original camel’s habitats, among pastoralist tribes at the arid borders of the earliest civilizations: for the dromedary in the coastal areas of the Arabian peninsula, for the Bactrian in SW-Central Asia. Domestication was definitely favored by the confident character of this animal and its working potential in the colonization of deserts: in fact, at the difference of other domestic species, in these arid peripheries the harvesting of camel milk and fleece happened more or less contemporarily with its use as transport animal. This last function grew progressively in importance, reaching the civilization centers during the II millennium BC and then diffusing in all arid regions of Afro-Eurasia.

A decisive step in the man-camel relation happened at the turn of the I millennium BC, when the amelioration of the saddle design and the artificial hybridization of stronger types enhanced the camel importance at different levels. On one side these innovations, in arid zones deprived of road infrastructure, determined the superiority of the loaded camel against all other types of wheel and draft transport, diffusing in that way its use as pack animal in the whole Middle East and in the continental networks of caravan routes. On another side, they allowed the transport of tents, increasing the mobility of camel breeding communities. Finally, they promoted the use of the camel as military animal, favoring camelry versus cavalry in the control of the desert expanses.

As a whole, with the start of the Christian Era, these factors conferred to nomadic camel breeders the monopoly of the Afro-Eurasian land transports and the military control of the entire arid zones. If in the northern deserts the Bactrian camel still faced the military concurrence of the horse, in the south the Arabian camel became the only arbiter of commercial business and war, heightening the power of the Arabic societies up to the spread of Islam and the establishment of the Caliphate.

In that way a ‘camel period’ started, that will endure until a couple of centuries ago. “Once, in ancient times, the Middle East teemed with carts and wagons and chariots, but they were totally driven out by the coming of the camel…When the first motor car chugged defiantly off the road and into the desert, an entire epoch in world history began to pass away, the epoch of the camel.” (Bulliet, 1973).

The important documents (archaeological reports, ancient literary sources, petroglyph representations, and DNA analyses) referring to the area and date of the domestication of both camel species are listed here below, distinguishing 3 steps and uses: as pasture, transport, and military animal.

2. Camel hunting and pastoralist domestication

Biological camel remains discovered in stratigraphic contexts at multiple sites are direct witness of camel presence in the region, but do not prove whether from hunting or domestication. The last is better suspected when findings consist of dung, hair-ropes, etc., i.e. pointing to a regular use of its body products.
2.1. Dromedary

In the coastal site of Sihi (Yemen) has been found a camel mandible and bone, most probably of wild dromedary, direct-dated to ca 7100-7200 BC. Dromedary bones have also been identified at sites in southeastern Arabia dating between 5000-4000 BC (Al Buhais, UAE); and in Jericho and Arad (Near East) and Ras Ghadana (Abu-Dhabi), dated to the late III millennium. Hair-ropes, only supposedly from dromedary, have been found in the Old Kingdom gypsum quarries of Umm es-Sawan (Egypt, 2500 BC).

Petroglyph representations of hunting of a wild dromedary are found in the Sha‘ib Musamma open-air site (Saudi Arabia) dated ca. 3000 BC (Anati, 1997; Bedanarik and Khan, 2009); and in the Egyptian art of the New Kingdom during the Late Bronze Age (XII century BC). These documents, although they don’t prove the establishment of domestication, at the very least suggest that the dromedary, hunted or domesticated, was present at these sites and used as a source of food (Fig. 1).

More significant are other findings pointing to the presence, around 3000 BC, of domesticated dromedaries in the coastal regions of SE-Arabia and in Egypt, probably for milking purpose (Bullet, 1975: 49). The earliest sound witnesses come from some coastal settlements along the southeastern Arabian Peninsula. The excavations of the early III millennium BC site of Umm an-Nar in Abu Dhabi recovered some 200 camel bones that, by showing an emphasis on juveniles, suggest an incipient stage of domestication (Hoch, 1977). This discovery is strengthened by DNA analyses of samples retrieved from ancient and modern camel remains, pointing as origin of domestication to the southeast coast of the Arabian Peninsula during the same period (Almathen et al., 2016).

Evidences of an early domestication in Egypt around the same time are debatable because based on findings possibly endowed of ritual meaning: a pottery camel’s head and a terracotta tablet with men riding and leading camels, both from Predynastic Egypt, i.e. before 3150 BC; 3 clay camel heads and a limestone vessel in the form of a lying camel carrying an ointment pot, dated to the First Dynasty (3050-2890 BC); and several models of camels from the Fourth Dynasty (2613-2498 BC) (Free, 1944; Saber, 1998). Some petroglyph representations of men leading dromedaries, exceptionally dated by juxtaposed inscriptions, testify the presence of domesticated camels in the region just few centuries later: near Aswan (Upper Egypt) such scene is accompanied with 7 hieratic characters dated to the VI dynasty (2345-2181 BC); in Wadi Nasif (Sinai) by an inscription referring to the XII dynasty, i.e. XIX BC (Gerster, 1961: 62).

From Egypt domesticated camels diffused westward along the Mediterranean coast, and southward along the Nile to Nubia; and, from here, after 1500 BC, to NE Africa and the Saharan region, as testified by their appearance in petroglyph sites (Clark and Brandt, 1978).

The hymns of the Rig Veda (1500-1200 BC) quote four times the presence in NW-India of herds of domesticated camels (Rig Veda 08, Griffith tr. 1892), and so do the Avestan Ghatas in Iran 500 years later.

In general we can say that during the Late Bronze domesticated dromedaries were fairly ubiquitous across Arabia, but still relatively few in Near East and Egypt, and even rare in Middle East. Certainly, here camels were already known around 1950-1600 BC, as witnessed by a Sumerian text found at Nippur from the Old Babylonian period, alluding to camel’s milk (Archer, 1970: 17); but a consistent presence can be suspected only at the start of the I millennium BC, when large herds are attested from excavations of the Iron Age Tell Abraq on the Persian Gulf, in the context of an intensive irrigation system.

2.2. Bactrian

The hunting of Bactrian camel is evidenced by archaeological excavations of the Neolithic site of Ayakagytma (Kyzylkum desert, UZ) where its bones, during the early Neolithic period, between 5500-3500 BC, constitute the 50-85% of the total osteological remains (Szymczak and Khudzanaizarov, 2006). Bones have also been found in Neolithic sites near Baotou (Inner Mongolia, 6000-5000 BC) and Lake Barkhol (Xinjiang, 3000 BC) (Olsen, 1988; Peters and Driesch, 1997). Being that in E-Iran the Bactrian is the only camel pertaining to the native fauna, are not surprising its early depictions on few archaeological objects from Sialk and Khorab, dated to the first half of the III millennium BC (Encyclopedia Iranica).

About its domestication, convincing are archaeological findings at the southern borders of West Central Asia, in Turkmensitan and Bactria, attributed to the IV-III millennium. “At farming settlements in Southern Turkmenistan, domesticated camel bones were found at Anau in the upper level of the southern mound, dating from the latter half of the IV millennium BC, and in Geoksyur-5 dated to the first half of
the III millennium BC. These offer the most ancient evidence of the domestication of Bactrian camels in the Old World” (Kuzmina 2015: 67). Faunal remains are also found at Shor-depe, Chong-depe, Hapuz-depe, in contexts dating to the Namazga IV period, i.e. 2500 BC (Kohl 1992: 186).

More significant, by being outside the native area of Camelus ferus, are the bone, dung, and woven hair dated to 2700-2500 BC found in Shahr-i-Sokhta (Sistan, SE-Iran), preserved in jars (Compagnoni and Tosi, 1978): these “reinforce the suppositions that these are domestic stock and that the Bactrian was here domesticated slightly later than at the border of Turkmenistan and Iran” (Wapnish, 1981: 104-105).

In its original habitats of Ukraina, Tartarstan, Western Central Asia and Western Siberia, are found archaeological traces of the domesticated Bactrian species dated to the turn of the II millennium BC, still unclear if result of northern diffusion or of independent domestication.

In the Middle East, the oldest reliable witness of the presence of domesticated Bactrian camel, like the one of the dromedary, is relatively late: the black obelisk of the Assyrian king Shalmaneser III (858-824 BC) depicting 2 camels in line held by ropes and driven by sticks, possibly pointing to their use in the context of incipient bio-techniques of hybridization (Potts, 2004).

3. Camel use as draft, pack and riding animal

Camels of both species started to be used as draft and pack animal (slave dromedaries) during the III millennium BC, apparently synchronously with their domestication, in connection with the exploitation of distant mines and commercial routes. Actually, the camel as draft animal is quite useless and cannot compete with bulls, donkeys and horses. It is instead the best beast for pack transport in arid environment, for two reasons: it is strong, docile and heat resistant, covering more than 100 km a day without drinking and with two time less food than a horse; and, by traveling without road infrastructure, is economically more efficient than carts. Because its docility and speed of 40 km/h, its use for riding would have happened simultaneously to the one of load carrier, in order to accommodate carovaneers, children and elders.

3.1. Dromedary

By far the earliest document of the use of a dromedary as pack animal is the limestone vessel shaped as a lying camel carrying a generic burden, dated at the First Dynasty (3050-2890 BC), already quoted above (par. 1.1). Its significance is debatable because found in a ritual funerary context, but its date matches the one of the earliest terracotta figurines of harnessed Bactrian camels found in Turkmenistan.

During the II millennium BC, when overland trade routes became relatively safe compared to the more dangerous sea navigation, domesticated dromedaries were associated with the emergence of the "incense route" along the western edge of Arabia, connecting the Sabaean coast with Egypt and Near East.

The Bible quotes its use in Near East as riding and pack animal from the start of the II millennium BC. Actually such date is not yet supported by archaeological findings that radiocarbon date its early presence in Israel between XII and IX BC.

In Egypt sound archaeological evidence of its domestic use is the statuette of a dromedary carrying 2 water jars, dated before 1200 BC (Redford, 1992: 277).

In E-Africa, at the turn of the I millennium BC, domesticated camels are used along the trade routes connecting the iron mines of the Kush empire and the gold and ivory resources of the Axum kingdom with the Sahara region on the west and the Swahili Coast on the south. Starting from that time, the establishment of a ‘camel period’ is documented in all the petroglyph sites of the Sahara region, NE-Africa and Arabia, consisting in the sharp enhancement of dromedary images by number, spatial centrality and artistic quality. (Boivin and Fuller, 2009)

Concerning the Middle East, here the first presence of transport camels is documented at a relatively late date, the turn of the I millennium BC, surely due to the longer endurance, in these early urbanization centers, of draft transports on road infrastructures. The earliest documents point to its introduction as riding and military animal, and then, after the appearance of the N-Arabian saddle (see note A), as main protagonist of a global switch from draft to pack transport (Fig. 2).

The riding of a dromedary is represented in the famous bas-relief found at Tell el-Halaf (Mesopotamia), attributed to the X BC: the saddle seems to be of S-Arabian style (see note A)). During the following four centuries, Assyrian
bas-relieves show several representations of camels mounted for military use (see below par. 4.1). Tablets from the Neo-Babylonian empire (550 BC) (Eph'al, 1982) and the accounts of Isidore of Charax (Isidore of Charax, 100 AD) provide the first unequivocal literary evidence of its use as transport animal under the Achaemenid and Seleucid empires and as pack animal among Parthians, Romans and Sasanians.

With the rise of the Caliphate, the use of loaded dromedaries diffused further east and west along all the trade routes of the Afro-Eurasian deserts. In fact, in the rock art record of W-Central Asia, dromedary images are quite rare and only appear after the Arabian conquest of the VIII AD.

3.2. Bactrian

On the basis of the existing materials, also the use of the Bactrian camel as draft animal seems contemporary to its domestication. In fact, in Turkmenistan, terracotta models of wheeled carts drawn by Bactrian camels are found at Altyn-depe, in contexts dated to the Namazga-IV period, i.e. around 2500 BCE (Kohl, 1992:186).

By the late third and early second millennium BCE the harnessing of Bactrian camel is attested in the iconography of copper-alloy figurines and stamp seals from Bactria, and in some representations (statuettes, seals) found in Iran and Pakistan.

Concerning the Middle East, a couple of Syrian cylinder seals depicting two humans sitting on the two humps of a Bactrian camel (possibly just ritually, given the iconographic language of the representation), dated to the 1800 BC, are a debatable witness of camel riding.

Several archaeological sites of W-Central Asia, dated to the early II millennium BC, retrieved remains of the domesticated Bactrian species that in some cases point to its use as riding or pack animal. In Kazakhstan, excavations of prehistoric settlements found faunal remains of domesticated Bactrian camels from the start of the Bronze age period (2000 BC): very rare and scanty in Central and South Kazakhstan; more abundant in the desert landscapes of the Syrdarya and Aral regions. This is the case of the excavations of the Toksanbai settlement (Ustyurt, XIX-XVII BC), where the osteological record doesn’t contain a single bone of wild camel but just of the domesticated species, with the largest individuals weighting around 600 kg. The remains refer to 141 individuals: it is a relatively small number counting for just the 0.6% of the heads of the all species of the inventory and for the 9.7% of the domesticated ones, which testifies its primary use not for body products but as pack animal. (Gauduchenko, 2012)

In the petroglyph record of South Kazakhstan, images of the Bactrian camel are very numerous, with the earliest dated to half of the II millennium BC. It is here represented as single image in few attitudes (running, standing, grazing, etc.) and in different compositions together with human personages: never drawn as hunted but with front legs tied together (hobbling), held by bit and bridle, mounted by rider, harnessed to a 4-wheeled char or to a 2-wheeled chariot. Morphologies and contexts rarely make suspect the wild species, most of them point to the domesticated one. The earliest representations are the ones of the harnessed and ridden Bactrian, attributed to the second half of the II millennium BC, fixing in that way the upper chronological limit of its domestication in this region (Figs. 3 and 4).

Not until the Zhou Dynasty (ca. 1100-771 BC) do Chinese literary sources confirm that Bactrian camels were domesticated and employed as beasts of burden (Olsen, 1988). Then their importance grew uninterruptedly in the Chinese culture: by the end of the millennium they were listed in the Annals among the animals taken captive on military campaigns, or sent as diplomatic gifts and tributes, or objects of trade, or protagonists in funerary rituals; and their image always competed the one of the horse in literature and visual arts (Fig. 5).

Their consistent presence in the Middle East is only documented around half of the I millennium BC by literary quotations and depictions: they are represented in the Apadana reliefs at Persepolis (V BC), spoken as mythical carriers of the Magi, harnessed to the chariots of the Roman emperors Nero and Heliogabalus. In Central Asia their image is found on metal plaques from the Oxus treasure (VI-IV BC) and from the Sarmatian kurgan at Filippovka (Urals) (IV BC).

Its use as pack animal grew in importance with the introduction of the new saddle (see note A)). Like the ‘camel period’ detected in the petroglyph sites of the Sahara, E-Africa and Arabia, so also in the petroglyph sites of Central Asia a
4. Camel Use as Military Animal

When compared to horses, camels are less aggressive, more emotional and less predictable, have less maneuverability and cannot explode into different tempos. But they had some military advantages, by being heavier and stronger, less nervous, and having in arid regions long endurance without water. Moreover, they would scare horses with their stench, and trample on stranded enemies.

Only after the introduction of new types of saddles enhanced their maneuverability, camels started to be used by armies for carrying archers and lancers, and also as freight animals instead of horses and mules.

4.1. Dromedary

The dromedary didn’t have appreciable military impact until the Late Bronze age, when the introduction of the S-Arabian saddle (1200 BC) increased its maneuverability and promoted its military use. After then, camels have been extensively used in wars throughout Africa and the Middle East, as witnessed by historical accounts and archaeological objects.

Two quotations from the Bible describe the use of camels in military actions: Samuel 30:17 and Isaiah 21:7, respectively dated around 1000 and 700 BC.

Assyrian inscriptions and bas-relieves are the first datable documents about the use of dromedaries in warfare. They quote the presence of Arab camel riders acting within or against the armies of the Assyrian king: more than 1000 camels have been used in the Battle of Qarqar in 853 BC between Assyria and Israel; under the Assyrian king Tiglath-Pileter (745 BC) the commanders of small military units were nomadic peoples imported from camel-grazing areas or camel bazaars (Eph'al, 1982); relieves of the Ashurbanipal palace in Niniveh show Arab camel riders pursued by the Assyrian cavalry (645 BC).

Herodotus refers that camels have been used in the Battle of Thymbra in 547 BC by the Persian king Cyrus the Great in its conquest of Lydia (Histories, book 1); and by king Xerxes-I together with Arab mercenaries in his massive army during the Second Persian invasion of Greece in 480 BC (Histories, book 6 and 7) (Fig. 6).

Romans first encountered dromedaries in the battle of Magnesia (Syria, 190 BC) where Antiochus III deployed Arab bowmen mounted on camels. After seeing such military potential, they introduced auxiliary forces known as ‘dromedarii’, whom they recruited in desert provinces, and even used camels of both species mounted with cataphracts. During Middle Ages, riders on armored dromedaries constituted the military substratum of the Muslim expansion.

4.2. Bactrian camel

Bactrian camels attained military use between 500-100 BC, a date confirmed by historical sources as well as by the petroglyph record of South Kazakhstan (Fig. 7).

The Dahae and Parni tribes, who lived in the sandy arid environments of the Aralo-Caspian region during the second half of the I millennium BC, utilized the heavy, double-humped Bactrian camels as a weapon of war against the cavalry of their neighbors, and they even mounted them with cataphracts.

Anyhow, when compared to the dromedary, the Bactrian camel, because its lesser speed and swiftness, in the deserts of
Central Asia didn’t represent a serious challenge to cavalry and was engaged not so much in direct warfare as in military logistics. Parthians (at Charrae, 53 BC), Mongols and Timurids extensively used Bactrian camels as pack animals in their military campaigns.

Notes

A) In history are documented 3 main saddle types for the dromedary, and 2 for the Bactrian (Baum, 2015). Dromedary - Somalí saddle, most primitive and intended for packing, uses the shoulders area of the camel in front of the hump, bounded by one or two pairs of vertical wooden branches fixed on the top and under the abdomen of the animal. S-Arabian saddle, introduced around 1200 BC mainly for riding, accommodates the rider in the rear part of the camel, from where it is possible to hang on the hump’s hairs but is relatively difficult to drive: it promoted the first military use of the camel. N-Arabian saddle, introduced around 500 BC for packing and riding, is the best saddle design up to our days, placed directly on the camel hump as a frame made of two reversed ‘Y’ joined together. It promoted the superiority, in arid environments, of packed camels against wheel and draft transports by doubling the possible load of the camel across lands without road infrastructure; and the superiority of military camelry against cavalry by enhancing the maneuverability of the animal (Fig. 2).

Bactrian camel - Old saddle corresponds to the simplest and earliest use of the Bactrian camel as mounted and pack animal, where the rider sits between the 2 humps, and 2 light packs and stirrups can be hanged on either sides. New saddle, introduced at the end of the I millennium BC, avoids the concentration of stress on the central part of the camel spine by adding 2 wooden poles, inflexible and bent, along the sides of the humps in order to distribute the burden’s or rider’s weight along the back of the animal.

B) What promoted camel hybridization is the fact that the first generation offspring of the cross between a dromedary and a Bactrian is stronger than both parents, and milky and fleecy half way between them. Its implementation can be suspected starting quite early on the climatic band where the crossing of the 2 species would occur naturally, i.e. between Anatolia, Middle East and Afghanistan; and certainly developed during the I millennium BC among Medians and Assyrians together with the increasing use of the camel as military and pack animal (Potts, 2004). But archaeological witness of the use of hybrid camels points to several centuries later. The first scientific witness comes from the morphometric analysis of selected camel bones from 12 graves of the cemetery near Mleiha, Sharjah, UAE, dated to the 300-150 BC: “According to their central position in the graveyard, the hybrids seem to have been status animals” (Uerpmann, 1999: 102). Then, remains of hybrid camels and camel figurines exhibiting the hump indentation characteristic of hybrids are found in several sites (Troy in Turkey and pre-Islamic Pella in Jordan) dated to the Roman-Parthian period (I-II AD).

C) Genesis 24:61 “Then Rebekah and her maids rose up and mounted the camels”; Genesis 37:25: “...looking up they saw a caravan of Ishmaelites coming from Gilead (Jordan), with their camels carrying aromatic gum, balm, and resin, on their way to carry it down to Egypt”: both quotes are attributed to the XIX BC. Actually among Hebrews camel flesh was not eaten as it was ranked among unclean animals. The Leviticus (11:4), dated from the XV BC, says: “There are some animals that only chew the cud or only have a divided hoof, but you must not eat them. The camel, though it chews the cud, does not have a divided hoof; it is ceremonially unclean for you.”

B) Some bones from excavations in the Aravah valley, dated to 930 BC, witness the use of camels as beasts of burden in the context of copper mining operations (Sapir-Hen and Ben-Yosef, 2013).

E) In Kazakhstan petroglyph representations of Arabian camel are very few, only found in the middle Syrdarya region (Karatau range) and dated to Medieval times.

F) Faunal remains of Bactrian camel are found in Andronovo sites of the Urals and the Chu valley (Tenlyk, Alekseevskoe).

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