

The primates of the western Palaeartic: a biogeographical, historical, and archaeozoological review

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Summary – *The Western Palaeartic is traditionally regarded as a zoogeographical unit which is lacking in primatological fauna. The representatives of this taxonomic group which has been documented within its boundary can be referred to the genera Macaca, Papio, and Chlorocebus, and possibly also to Erythrocebus and Galago. The data for the present research were collected through a review of all previous knowledge of the primates of this biogeographical region, including their history, and through original sightings and direct observation of field signs. Surveys were carried out directly in North Africa, the peninsula of Gibraltar, and in the Sahara. Additional data on primate distribution were obtained through the examination and evaluation of the materials conserved in several museums. A historical and archaeological investigation was also carried out, appraising both archaeozoological findings and prehistoric and ancient artistic production, in order to evaluate the importance of the monkeys of the Western Palaeartic in relation to local human activities and needs.*

Keywords – *Ethnozoology, Macaca, Papio, Chlorocebus.*

*"Hamadryads. A type of wood-nymph.
All dryads are concerned with trees and live in
them when they are roaming the forest
- but each hamadryad is the spirit of a
particular tree.
She lives always in this tree and speaks out to
warn woodman away
when they try to set an axe to her tree.
When the tree dies, she dies too"
(Euslin, 1988)*

The Western Palaeartic

The Palaeartic region has been recognised and acknowledged as a natural zoogeographic region since Sclater first proposed it as far back as 1858. It can be defined approximately as the continent

of Eurasia north of the Himalaya along northern Africa, including the northernmost part of the Sahara (cf. Corbet, 1978). Like all faunal regions, however, there can be no precise definition of the Palaeartic (Vaurie, 1965; Cramp, 1977). In fact, zoologists have frequently found difficulty in delimiting this zoogeographical area. Ellermann & Morrison-Scott (1951), for example, argued that certain arbitrary limits must be set in its definition. They suggest drawing the African boundary along the 20°N parallel which, considering the barrier of the Sahara: "... *does correspond reasonably well with the facts*". Nevertheless, this means that several Saharan mountainous complexes and their peculiar biocenoses, such as the Nigerian Aïr massif, and archipelagos, such as Cape Verde and/or the Farasan Islands (Saudi Arabia), are not comprised within the borders of this zoogeographical

range, which does however include areas such as the Tassili n'Ajjer (Algeria), and the Tibesti (Chad). Corbet (1978) instead suggests that the African boundary of the Palaearctic Region starts in the west at 21°30'N, between Rio de Oro and Mauritania, continues across Mali at the same latitude and thereafter follows the political boundaries so including Algeria, Libya and Egypt entirely and excluding the whole of Niger, Chad and Sudan. The entire Arabian peninsula is included, as are the Ahaggar mountains (Algeria), while most of the Tibesti range is excluded. Furthermore, in detailing the current western boundary of the Palaearctic Region, Corbet (1978) includes the archipelagos of Spitzbergen, Iceland, the Azores, Madeira, and the Canaries, but excludes the islands of Cape Verde. On the other hand, following Vaurie (1959-1965), Cramp (1977) suggests comprising within the Western Palaearctic all the eastern Atlantic islands south of the Cape Verde archipelago, adding the Banc d'Arguin group (Mauritania) - but not the adjoining Mauritanian mainland - where the extensive research of de Naurois (1969 and 1994) have clearly demonstrated the Palaearctic character of the avifauna. Although the easternmost territories of the Indian subcontinent, such as Gujarat and Rajasthan, are not biogeographically comprised within the boundary of the Palaearctic, they nevertheless display several zoogeographical elements characteristic of the latter biogeographical region (cf. Masseti, 2002b); south of the Sahara, the mountainous slopes of east Africa are characterised by the relic distribution ranges of the ibex, *Capra ibex* L., 1758, and other Palaearctic *taxa*.

Although not as numerous as those distributed in the Afrotropical, Oriental and Neotropical biogeographical regions, the Palaearctic monkeys comprise various species, including inter alia the Barbary macaque, *Macaca sylvanus* (L., 1758), the Japanese macaque, *Macaca fuscata* (Blyth, 1875), and possibly the snub-nosed monkey, *Rhinopithecus roxellana* (Milne-Edwards, 1870). This monkey is the leaf-eating primate with the most northerly distribution, occurring in the mountainous areas of Sichuan and the southern parts of Gansu, Hubei and Shaanxi (cf. Ho

& Chiu, 1983). Its diffusion to the north may not extend beyond 30°26'N, 102°52'E (Groves, 2005). However, broadly speaking, the northernmost limit of the dispersion of primates in the Palaearctic is represented by the natural diffusion of the Japanese macaque (apart from the "everywhere" ape called *Homo sapiens*). This comprises most of the Japanese archipelago, including even the southern areas of the island of Hokkaido, located above the 42°N parallel, at the north end of Japan opposite the Russian island of Sakhalin. The northern pig-tailed macaque, *Macaca leonina* (Blyth, 1863), is distributed as far as Yunnan (China), north of 25°N, whereas the distribution of the Assam macaque, *Macaca assamensis* (McClelland, 1839), ranges from the Himalaya foothills up to 2,750 m. in central Nepal east into Tibet and southeast China (Groves, 2001). The Formosan rock macaque, *Macaca cyclotis* (Swinhoe, 1862), may also fall within the boundary of the Palaearctic, being naturally limited to the island of Taiwan, comprised between 22°N and 26°N (Groves, 2001). Corbet (1978), however, includes only a handful of primates among the faunal elements of the Palaearctic Zoogeographic Region: 4 macaques and 1 baboon. In fact, for the genus *Macaca*, he considers the two species *M. sylvanus* (L., 1758), and *M. fuscata*, respectively isolated in North Africa and in the Japanese archipelago, together with *M. mulatta* (Zimmermann, 1780), native of central Asia, from Afghanistan to southern China, and probably introduced in an area in the surroundings of Beijing (Ellermann & Morrison-Scott, 1951) but apparently extirpated in 1987 (Zhang *et al.*, 1989; Fooden, 2000); and *M. cyclopis*, native of Taiwan, as mentioned above, and imported onto the Japanese islands of Oshima and Izu. The only representative of the genus *Papio*, considered by Corbet (1978), is the hamadryas, *Papio hamadryas* (L., 1758), a species still dispersed in eastern Africa and in the southern Arabian peninsula, which he reputed to have inhabited northern Africa and the Egyptian territories in ancient times. Some years earlier, Ellermann & Morrison-Scott (1951) also considered the sacred baboon as the only representative of the genus occurring in the Palaearctic region

due to the fact that they took the African southern boundary of this biogeographical region to be the 20th parallel. Papionins are well documented in the Western ethnological environments, having represented an attractive topic for painters and other artists from the earliest to more recent historical times (Plate 1).

The Western Palaearctic is the western portion of the Palaearctic zoogeographical region (cf. Cramp, 1977). The suggested boundaries exclude Greenland (Cramp, 1977), but include all the islands of the eastern Atlantic Ocean up to Cape Verde, i.e. the whole of Macaronesia, including the Azores, Madeira and the Canary islands (Vaurie, 1959; Coutinho Saraviva, 1961; Naurois, 1969; Sunding, 1970, 1979; Kunkel, 1980; Gonzales Henriquez *et al.*, 1986; Beyhl *et al.*, 1995). Thus the northernmost boundary of the Western Palaearctic would be located in the north-eastern Atlantic Ocean and in Arctic Sea. Vaurie (1959-1965) and Cramp (1977) include the Sahara south of the northern borders of the Sahel region within the perimeter of this zoogeographical area. However, they include the mountain massif of Tibesti, which is located above the 20th parallel and exclude those of Air (Niger) and Ennedi, where the Afrotropical element predominates. To the east, the boundary could be limited to the northern Arabian peninsula (cf. Harrison, 1964), or alternatively could run northwards along the eastern border of European Russia (cf. Tutin *et al.*, 1964), and of the Caspian Sea, including almost all of Iran (Guest & Al-Rawi, 1966; Masseti, 2002). In any case, as Cramp (1977) argues, if the boundary of the Palaearctic region eludes any logically unequivocal demarcation, the determination of the eastern limits of its western part is clearly largely arbitrary. Thus, the same author includes all European Russia, using the limits which are internationally accepted for the *Flora Europea* (Tutin *et al.*, 1964), and, further south, he includes the remaining regions of the former USSR between the Caspian Sea and the Black Sea, Anatolia, Iraq and Kuwait, but excludes the whole of Iran. However, according to other authors, such as Guest & Al-Rawi (1966) and Masseti (2002), Iran is wholly comprised within

the boundary of the Western Palaearctic up to the border with the eastern Indian sub-continent. Furthermore, Martin & Hirschfeld (1998) propose the inclusion of the entire Arabian peninsula, excluding two small areas where Afrotropical influence is dominant - a land strip along the southern coast of the Red Sea, and the Afrotropical enclave between Dhofar (Oman) and the Mahral Province of Yemen - together with part of Iran in the geographical area formally treated as the western subdivision of the Palaearctic. Here, the primate belt extends from approximately 36°N in the northern Maghreb to approximately 20°S in the southern Sahara which, as mentioned above, is roughly considered the southern boundary of this biogeographical unit. To the north, monkeys are not found outside this geographic limit, with the exception of small communities introduced by humans, such the *M. sylvanus* colony of Gibraltar (cf. Napier & Napier, 1985) (Fig. 1).

This current research is the result of a series of studies carried out in several of the territories of diffusion of the Western Palaearctic monkeys. Data were collected through a review of all previous knowledge of the primates of this zoogeographical region, including their history, through original sightings and direct observation. Surveys were carried out directly in Northern Africa, the peninsula of Gibraltar (UK), and in the Sahara. Additional data on the primate distribution were also obtained through the examination and evaluation of the materials conserved in the following museums: the Forschungsinstitut and Natural History Museum Senckenberg, Frankfurt am Main (SMF); the Natural History Museum in London (BMNH); the Odontological Museum of the Royal College of Surgeons of London (RCS OM); the Institut Français d'Afrique Noire, Dakar (CG. IFAN); the Libyan Museum of Natural History of the Assaray Al-hamra Museums, Tripoli; the Natural History Museum of the University of Florence, Zoological Section "La Specola" (MZUF); and the "Giuseppe Sergi" Museum of Anthropology of the "La Sapienza" University of Rome. A historical and archaeological investigation was also carried out, appraising both archaeozoological

findings and prehistoric and ancient artistic productions, to evaluate the importance of the monkeys of the Western Palaearctic in relation to local human activities and needs. Original archaeozoological data from the Tadrart Acacus (Libyan Sahara), and one modern osteological find from the archipelago of Farasan (southern Arabia), are also discussed. An additional aim of this work is to attempt to concentrate the entire existing bibliography regarding the primates of the Western Palaearctic.

List of the species

Within the vast geographic area represented by the Western Palaearctic, there are very few *taxa* of primates which existed – and still exist – as wild or feral free-ranging populations. There are essentially six or seven species: the Barbary macaque, *Macaca sylvanus* (L., 1758), the olive baboon, *Papio anubis* (Lesson, 1827), the sacred baboon, *Papio hamadryas* (L., 1758), the patas monkey, *Erythrocebus patas* (Schreber, 1775),

and the green monkey, *Chlorocebus sabeus* (L., 1766), to which we may possibly also add the grivet, *Chlorocebus aethiops* (L., 1758). Another representative of the Order of Primates (Family Galagidae), the Senegal bushbaby, *Galago senegalensis* É. Geoffroy, 1796, has also been recorded from one of the areas adjacent to the southern boundary of the Western Palaearctic, the Saharan mountainous massif of Ennedi, in Chad. Individuals of several of these species have often been transferred beyond their natural distribution for various human needs. It is not immediately apparent why humans should have wanted to export these animals, and the phenomenon can only be explained by considering each case individually. However, evidence suggests that in many cases they were transferred voluntarily by humans. Furthermore, historical, ethnozoological and archaeozoological studies document the fact that monkeys were utilised as food, for medicine, as pets and for other purposes from prehistoric times onwards.



Fig. 1 - Boundaries of the Western Palaearctic within the palaeontological (grey) and extant (dark grey) range of non-human primates. The suggested boundaries of the Western Palaearctic comprise within their perimeter the Sahara south of the northern borders of the Sahel region, including the mountainous massif of Tibesti, which is located above the 20th parallel, and the archipelago of Cape Verde.

**Barbary macaque or Barbary ape,
Macaca sylvanus (L., 1758)**

French: *magot*

Spanish: *mona de Gibraltar, mona de Berberia*

Italian: *bertuccia, bertuccia berbera*

German: *magot*

A unique characteristic of *Macaca sylvanus* (L., 1758) is the absence of a tail, as in true apes. This is the only macaque found outside Asia (Richard *et al.*, 1989). Linnaeus described its taxonomy in his *Systema Naturae* (10th ed. 1: 25), on the basis of the examination of specimens from the "Barbary coast". A portrait of Barbary macaque already figured among the various representations of animals in Gesner's *Historia Animalium*, the first edition of which was printed in Zurich in 1555 (Plate 2a). Nevertheless, it is not possible to determine the *terra typica* of this species which Linnaeus had established on the basis of the very approximate representation of a captive specimen, published by Prosper Alpin in his *Historia Naturalis Aegypti* (1581-1584), vol. II, pl. XVI (cf. Cabrera, 1914; Fenoyl, 1980). (Plate 2b). The Barbary macaque is the only primate indigenous to the Western Palaearctic, where it occurs further north than any other non-human species, also being the only macaque found in Africa (Waters *et al.*, 2007). Together with the wild rabbit, *Oryctolagus cuniculus* (L., 1758), several representatives of the genus *Lepus*, the Iberian lynx, *Lynx pardinus* (Temminck, 1827), and a few other species, *M. sylvanus* figures among the medium sized mammals endemic to the western Mediterranean zoogeographical unit (cf. Masseti, 2002). Barbary macaques are confined to fragmented populations throughout their current natural range, western North Africa, where they are discontinuously distributed in the subtropical mountainous areas of Morocco and Algeria (north-western Maghreb) (Cabrera, 1932; Richard *et al.*, 1989; Fa, 1999). They are separated from the nearest Asiatic population of the genus *Macaca* by a distance of more than 5000 km (Camperio Ciani, 1986).

According to Szalay & Delson (1979), this genus appears to be of North African provenance, where it seems to have developed in the Miocene and is still present. The mtDNA evidence confirms the deduction from morphological studies, corroborating hypotheses of the Africa origin for the genus *Macaca* (Morales & Maelnick, 1998; Fooden, 2005). Two or three hundreds years ago the monkeys were already living in the southern Iberian peninsula (Richard *et al.*, 1989), where they are present today on the Rock of Gibraltar (UK) (Fig. 2). The present distribution of the species is the remnant of a much more widespread population which, up to the last glacial episode, inhabited vast areas in Europe and Africa (Camperio Ciani, 1986). In fact, during the Pleistocene *M. sylvanus* was widespread not only in northern Africa but also in Europe (Kurtén, 1968; Delson, 1980; Camperio Ciani, 1986; Kowalski & Rzebik-Kowalska, 1991). Older African finds date back to the Pliocene (Ain Brimba, Ichkeul) onwards (Kowalski & Rzebik-Kowalska, 1991). Neolithic remains of the species are known from the littoral Algerian site of Boulevard Bru (Flamand, 1902), and the upper part of Djebel Thaya, in the Saharan Atlas (Bourguignat, 1870). Also Gautier (1993) comprises this monkey in the archaeozoological inventory of the Maghreb. Barbary macaques are extinct in Tunisia and Libya (Haltenorth & Diller, 1977).

In their extant Maghrebi distribution, the macaques are most abundant in high, mixed cedar and evergreen oak forest (Deag, 1977; Fa, 1984; Ménard *et al.*, 1985; Macharias *et al.*, 1999). They can be encountered in the upper reaches of the mountains in winter, despite low temperatures and snow (Kowalski & Rzebik-Kowalska, 1991). At lower elevations, deciduous and evergreen oaks are dominant, grazing pressure is intense, cultivation widespread, and monkeys occur only in certain forests, always at low density (Deag, 1977; Fa, 1984; Macharias *et al.*, 1999). They are also found at very low density in scrub forest and on treeless mountain ridges. Evergreen forests of cedar and oak appear to be the optimal biotope, where the population

density is highest and there is also the highest survival rate of young (Ménard *et al.*, 1985). In the deciduous forest these parameters are lower. Persecuted in the plains because of damage to crops, orchards and gardens, they are partial to rocky areas, featuring gorges and rock shelters. Rocky slopes without arboreal vegetation, however, are unfavourable for these primates, because they always need to be near water. Over its entire range in Morocco and Algeria, the species was previously estimated to number 9,000-23,000 individuals (Fa *et al.*, 1984; Oates, 1996), but recent population estimates in the species' stronghold, the Middle Atlas mountains in Morocco, record a dramatic decrease in number over the last decade (Camperio Ciani *et al.*, 2005). This population decline is attributed to the loss of prime habitat, mainly cedar forest, which has significantly decreased due to the growing impact of overgrazing by mixed flocks of goats and sheep, and the consequent degradation of the forest. Human-caused habitat deforestation in the Middle Atlas further risks compromising the future of the world's only remaining large *M. sylvanus* population. Outside the Middle Atlas,

the Moroccan populations of these macaques are very fragmented (Cuzin, 2003). In northern Morocco, a few scattered groups can be found in disturbed habitats in the Rif and the coastal Mediterranean region (Lakhdar *et al.*, 1975; Fa *et al.*, 1984; Mehlman, 1989). Macaques are currently reported from four areas of the Djebela region: Djebel Moussa, west of the Spanish possession of Ceuta; El Haouz, south of Tetouan; Djebel Bou Hassim, south-west of Tetouan; and Djebel Talassamtane, south of Chaouen (Waters *et al.*, 2007). Recent surveys indicate that the total population of the Djebela has dropped to no more than 200-300 individuals. Although some areas where the species is found are now protected, further commitment to safeguarding the species will be crucial in northern Morocco. In the southern part of the same country, a small relic population also dwells in the western High Atlas mountains (Fa *et al.*, 1984; Mehlman, 1989; Cuzin, 2003), being present in the valley of the Oued Ourika, south-east of Marrakesh. In this area, monkeys have been recorded from the low gorges of Assif Tinzer up to the western slopes of Jbel Yagour, and also in the high valley of

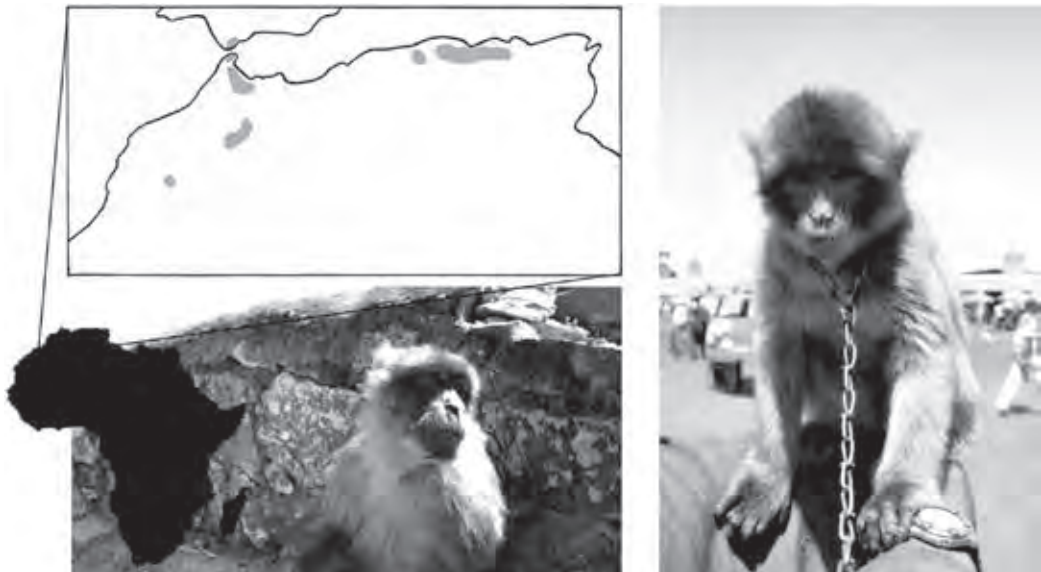


Fig. 2 - The dispersion of Barbary macaques is today confined to western North Africa (Morocco and Algeria), and the Rock of Gibraltar, in south-western Europe (photo Emiliano Bruner).

Oued Zat (Deag & Crook, 1971; Cuzin, 1996). Around the mid 1980s, the population of the Ourika valley was estimated at about one hundred individuals (Aulagnier & Thevenot, 1986). According to Cuzin (2003), the continuous decrease in number of these monkeys indicates the vulnerability of the High Atlas population.

In Algeria the species is dispersed throughout the regions of Djurdjura and Kabilia (Kowalski & Rzebiak-Kowalska, 1991; Fa, 1999), where it occurs from sea level up to the mountain tops (the highest peak of the Djurdjura Mts. is 2,308 m a.s.l.). Specimens from the “Gorge de la Chiffa” (*Gargide Chiffa*), 36°30'N 2°45'E, are present in the collection of the Natural History Museum of London (BMNH 1939.3471), and the University Museum of Zoology of Cambridge (CMZ E7495A, E7495B). The former institution also holds another Algerian specimen from Stora (BMNH 49b). According to Kowalski & Rzebiak-Kowalska (1991), some of the Algerian territories still inhabited by Barbary macaques were probably more extensive in the past, and the animals also occurred in other areas. Nevertheless, the same authors are of the opinion that the range of these primates has not been greatly reduced. Genetic research indicates that the world population of the Barbary macaque is divided into at least 5 different subpopulations (von Segesser *et al.*, 1995; Martin & von Segesser, 1996; von Segesser *et al.*, 1999).

Barbary macaques in antiquity and the Middle Ages

Together with the baboon and the guenon, the Barbary macaque was perhaps the best-known species of primate in ancient times. Despite it seems that there are no depiction of these monkey in Pharaonic art (cf. Groves, 2006), at least 20 skulls of *M. sylvanus* were instead provided by the archaeological investigation of the sacred animal necropolis at Saqqara, dating from after 300 B.C. (Goudsmith & Brandon-Jones, 1999). It was the *pithekos* of Aristotle, being more widely distributed during classical times, thus generating a general portrait of the tailless “apes” of Africa and Asia (Spencer, 1995; Rolfe & Grigson, 2006). It seems that monkeys of various sorts were not uncommon

in the Roman world as novelties and curiosities (King, 2002). Pliny the Elder made various comments on monkeys in general (*Naturalis Historia*, 8.215-216), particularly on their intelligence and cunning, but he only distinguished tailed from tailless primates in a generic manner. Apes and monkeys were often dressed up as performers, with various articles as props (McDermott, 1938; Toynbee, 1973), and this practice appears to have continued up to Medieval, Renaissance, and even modern times. An illustration of this can be found in a detail of the mosaics that decorate the northeastern hall of the imperial palace of Byzantium (register I, sector C, panel Co), Istanbul (Turkey), where a clothed monkey is attempting to catch a bird from the top of a tall tree, using a lime-twig (Jobst *et al.*, 1997) (Plate 3). The production of these mosaics dates to the first half of the 6th century AD. Effectively, the Roman portrayal of monkeys is largely derived from Eastern, Greek, and Hellenistic art, as demonstrated by the preponderance of catalogue entries from those sources in McDermott (1938). Barbary monkeys, in particular, were probably more accessible to Roman hunters and trappers than other species, but this does not rule out the importation of specimens of other primates from more far-flung areas, such as sub-Saharan Africa and/or the Indian subcontinent. Among the ruins of Pompeii (Naples, southern Italy), osteological and artistic evidence of the artificial presence of the monkey is not rare (King, 2002). For example, the incomplete postcranial remains of a unique find of a juvenile Barbary macaque skeleton was identified using osteology and ancient DNA techniques, although its provenance is unspecified (inv. no. Lab. 16) (Ciarallo & De Carolis, 1999; Bailey *et al.*, 1999). It is most likely to have been an exotic pet, probably a macaque, and therefore, according to King (2002), probably, a Barbary ape. In England, osteological remains (maxilla and palate, calvarium) of a sub-adult *M. sylvanus* were provided by the archaeological exploration of Catterick Fort (Yorkshire, UK) chronologically dating to the Romano-British period (cf. Napier, 1981; Lynn, 1997). They are now preserved in the collection of the British Museum, London (BMNH 1977.3120).

Lynn (1997) recorded other “British” remains of the species from Dunstable, Bedfordshire, dated to the late 2nd century A.D.

However perhaps one of the most intriguing finds is that of an exemplar which came to light in Spain, in the old Roman city of Iulia Livica (Llívia, Cerdanya), in the vicinity of Empúries (Catalonia), where the tomb of a Barbary macaque was found (Guardia & Maragall, 2004; Aliqué, 2007) (Fig. 3). Discovered along with the buried animal was a series of military decorations that were part of its personal accoutrements, including belt buckles and a number of bronze plaquettes (Guardia *et al.*, 2005). Both the chronology attributed to these finds and their stratigraphic

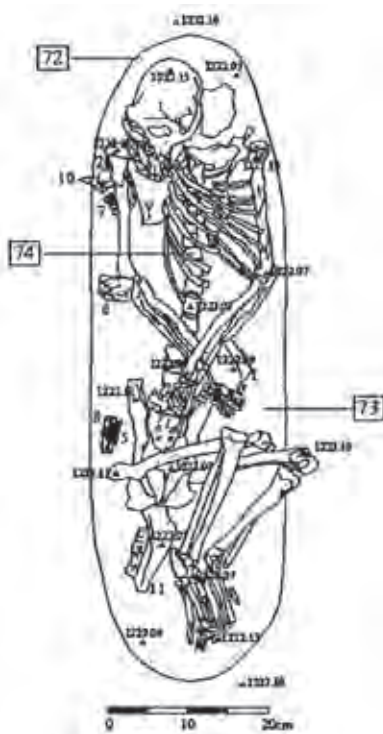


Fig. 3 - Drawing of the tomb of a Barbary macaque from the ancient Roman necropolis of Iulia Livica (5th-6th centuries AD, Catalonia). The animal was buried with military decorations (belt buckles and bronze plaquettes), suggesting it may have been a military mascot (after Guardia *et al.*, 2005).

position have made it possible to date the inhumation of the monkey to between the 5th and 6th centuries AD. The military characteristics of its apparel suggest that the Barbary macaque may have been either a pet or a military mascot.

M. sylvanus was perhaps the most famous primate in the Western World even in medieval times (Wendt, 1959; Masseti, 1991). In 1558, an engraving representing a monkey hunt was comprised in an extensive series of plates depicting various aspects of the hunt in sixteenth century Europe (Plate 4). This was published in Antwerp, with the title of *Venationes Ferarum, Avium, Piscium*, by the Flemish artist Jan van der Straedt, also called Antonio Stradano (cf. Baroni Vannucci, 1997). Several peculiar characteristics of the morphological rendering of the monkeys, and in particular the complete absence of any tail suggest that the animals portrayed are undoubtedly *M. sylvanus*. Via the Mediterranean, the Barbary macaque spread extensively to Italy (Hill, 1966), where it has frequently been portrayed in artistic artefacts from at least the end of the 14th century. It is in fact included, along with reproductions of other animals, in the famous Giovannino de' Grassi sketchbook preserved in the Biblioteca Civica Angelo May of Bergamo (Codice Cassaf. 1.21, f. 5r.) (cf. Recanati, 2005).

Barbary macaques are presented to the newborn Christ in the panel of the *Adoration of the Magi*, painted by Gentile da Fabriano between 1420 and 1423 (Florence, Uffizi), and in the fresco by Benozzo Gozzoli on the same subject in the Florentine Palazzo Medici Riccardi. In Renaissance Florence, the image of the species is evoked in various art works in the gardens of Boboli. Several bronze Barbary macaques decorate the *Fontana delle Scimmie* (“fountain of the monkeys”), formerly erroneously ascribed to Pietro Tacca, and possibly inspired by the bronze sculptures of primates created by Giambologna for the Florentine fountain of “*Samson and the Philistine*” in the Casino of San Marco (Masseti 1991). The images of two almost life-size Barbary macaques, in polychrome marble (*marmo mistio*), were also realized by the sculptor Cosimo Fancelli - possibly to a model by Baccio Bandinelli - around

1555, in the *Grotta degli Animali* or *Grotta del diluvio* of the Medici Villa of Castello, near Florence (cf. Masseti, 1991; Acidini Luchinat, 1992; Paolucci, 2000; Masseti, 2008) (Plate 5). However, one of the most amazing representations of this primate of all Italian art is again to be found within the perimeter of the Boboli gardens: in the frescoes painted in the first hall of Buontalenti's *Grotta Grande* by Bernardino Poccetti between 1586 and 1587, during the last years of the Grand Duke Francesco I de' Medici, (cf. Chiarini, 1977). One individual of Barbary macaque is portrayed sniffing a Damascene rose (Plate 6). This was the same attitude in which Suleyman the Magnificent, extraordinary sultan of the Ottoman empire from 1520 and 1566, generally chose to be portrayed. Suleyman, who doubled the territory of the empire during the 46 years of his rule, wished to be painted in this pose which emphasised his sophistication and sensitivity rather than underscoring his fame as a ruthless conqueror. The domain of Suleyman the Magnificent extended from the surroundings of Vienna far to the east and into Egypt and Persia, while his fleet dominated the Red Sea and virtually the whole of the Mediterranean basin. Consequently, it's not difficult to imagine why the artist who evoked the scene of the "sniffing monkey" in the Boboli gardens was asked by Francesco I, or someone else at the Medici court, to paint a caricature of the Muslim enemy. The image of a Barbary macaque was thus transformed into an amazing personification of the detested Islamic world and its ruler.

Macaques on the Rock: the colony of Gibraltar

As mentioned above, the present distribution of *M. sylvanus* comprises a European enclave coinciding with the boundary of the promontory of Gibraltar, a British possession in the Iberian peninsula since 1704 (Zeuner, 1952). The Barbary apes of Gibraltar constitute the oldest established colony of free-ranging monkeys in Europe (Lever, 1985). In fact, the anthropochorous origin of this population is beyond all doubt. Although it is uncertain exactly when the macaques were first introduced to the Rock (Hill, 1966), they

are known to have resided there for at least the past 265 years. Groves (2001) refers to a possible introduction of the species in Roman times. Others sustain that the animals may have been introduced onto the Rock from North Africa by the Moors who, under the Saracen Tariq, captured and fortified Gibraltar in 710-711 AD (Hill, 1966; Lever, 1985). Mediaeval chronologies also coincide with the earliest appearance in the Iberian peninsula - and in Europe - of other African mammals of medium size, such as the common genet, *Genetta genetta* (1758) (cf. Morales, 1994), and the Algerian hedgehog (Morales & Rofes, 2008). However, since no mention of monkeys is made during the period of Spanish occupancy between 1492 and 1704, it is possible that the Moorish importation died out, subsequently being replaced by new stock (cf. Lever, 1985). On the other hand, Zeuner (1952) considers that "... it is certain that apes were present on the Rock when Gibraltar was captured by the British in 1704". Following Cabrera (1914), Garcia (1979) and Castells & Mayo (1993) are also of the opinion that the macaques were already present on the Rock before the British occupation, whereas Fa (1981 and 1999) declares that they were released on the promontory in the early 1740s. In effect, the earliest certain account of monkeys on Gibraltar dates back only to this year, when mention is made of a large importation of apes "*and other game from Barbary*", and when a poll tax was levied on "*apes, Moors, Jews and other aliens*" (cf. Lever, 1985). At this time, on Gibraltar, monkeys were regarded as game for hunting, for the enhancement of which other animals including Barbary partridges, *Alectoris barbara* Bonaterre, 1790, were also imported onto the Rock from the Maghreb (cf. Lord Lilford, 1866; Cortés *et al.*, 1980; Johnsgard, 1988). It was in fact not until a century later, in 1856, that a Garrison Order was finally issued which prohibited the killing of the monkeys for any reason. Despite this, seven years later only three macaques remained on the Rock (Lever, 1985). From this time on, Barbary apes have always been protected within the perimeter of Gibraltar and their contingents restocked

from North Africa, as need arose. Files kept at the Gibraltar Regiment tell the story of the “Rock apes” from 1913, the year when a Master Gunner was first given the task of feeding the macaques (Garcia, 1979). There are reports of at least three other introductions of monkeys from Morocco to Gibraltar, the last of which (1939-1943) gave rise to the current population of Gibraltar (Anon., 1880; Garcia, 1979; Fa, 1999). It was traditionally believed that the Gibraltar stock essentially originated from those monkeys found in Anjera on the Gibraltar Straits, in the vicinity of the aforementioned Jebel Músa (Djebel Moussa), “... known to Europeans as *Apé’s Hill*” (Meankin, 1901). Recent genetic analyses effectively confirm that the extant population of macaque in Gibraltar descended from a handful of individuals imported during World War II from north-western Africa. They were, however, found to include Algerian and Moroccan haplotypes, revealing a dual origin of the founding females (Modolo *et al.*, 2005). Other genetic studies show that human intervention has had marked effects on genetic equilibrium and heterozygosity (Segesser *et al.*, 1995; Martin & Segesser, 1996; Segesser *et al.*, 1999). It is in fact possible to trace the origin of the founders of the Gibraltar colony, back to Morocco, probably to the Middle Atlas, perhaps with some residual influence of animals imported earlier from Algeria.

Macaques are traditionally confined to the higher and less frequented parts of the Rock of Gibraltar (cf. Sclater, 1900). At present, there are some 300 animals in five troops occupying the area of the Upper Rock, with occasional forays into the town in monkey mayhem. Despite this, the macaques are a tourist attraction. Notwithstanding extensive evidence of viral transmission from macaques to humans associated with biological wet vectors (urine, blood, saliva – see Brack, 1987; Cavicchio & Friedrich, 2006), the monkeys are allowed free contact with visitors. Viral infections are highly dangerous and can even lead to death (e.g. through meningitis). In view of the lengthy course of such pathologies, the correlation with the original source of contamination is not easily recognisable.

Olive baboon or Anubis baboon, *Papio anubis* (Lesson, 1827)

French: *babouin doguera, papion anubis*

Spanish: *papión perruno*

Italian: *babuino verde*

German: *Anubispavian* or *Steppenpavian*

Today, baboons are unknown in North Africa, occurring only from the central Sahara southwards, their northernmost limit of dispersion being around 15°N (cf. Haltenorth & Diller, 1977). From a taxonomic point of view, five species are currently recognised within the genus *Papio*, (Muller, 1773). Among them, the olive baboon, *Papio anubis* (Lesson, 1827), is a large sized baboon which is still dispersed from Mali to Eritrea (Zinner *et al.*, 2001), Kenya and north-western Tanzania (Napier & Napier, 1967; Groves, 2005). This is an Afrotropical species which could have been represented by some populations in ancient north-eastern Africa, and possibly in Egypt.

The olive baboon in ancient Egypt

As with other primates, in Egypt there are no early osteological records of distribution, although baboons have frequently been found as mummies, even in great numbers (Kessler, 1989; Osborn & Osbornová, 1999). Boessneck (1988), for example, recorded that mummies of this species had been found in the Tuna el Gebel necropolis, west of Hermopolis. Olive baboons were also found at Thebes (Osborn & Osbornová, 1999). Various other sites that yielded Late Period (1085/1070-332 BC) mummies of the species include Hermopolis Parva (Damanhur, in the western Delta), Tanis (Zoan, in the eastern Delta), Kom Madinet Gurab near El Lahun southeast of El Fayum, Mustai in the south central Delta, and some questionable remains at Saqqara (Osborn & Osbornová, 1999). In the art of the Dynastic period, illustrations of Anubis baboons are rare. The phenotypic characteristics of the species, such as the protruding nostrils and angled tail, are not clearly represented, nor can facial and buttock coloration always be verified.

The artistic evocation of olive baboons appears – on one of the ships being loaded in the Punt expedition launched by the Queen Hatshepsut, together with the homecoming ships laden with bounty from Punt - in the mural decoration of her temple at Deir el Bahari, in Thebes (18th Dynasty, around the middle of the 2nd millennium BC). One of the best representations of these baboons is, however, reputed to come from the tomb of Khnumhotep, of the 12th Dynasty (1991-1785 BC), at Beni Hasan (Osborn & Osbornová, 1999). The animals are depicted in a fig tree, and are a dark green colour with reddish-brown faces and callosities and without mantles (Plate 7). Ermann (1894) regarded them as monkeys helping with the harvest. Other authors, such as Houlihan (1997), consider that this is unlikely, since the baboons appear to be about to eat the figs in their hands. Goudsmith & Brandon-Jones (1999) identified 149 skulls of *P. anubis* in the baboon catacomb of the sacred animal necropolis at Saqqara (after 300 B.C.). In ancient Egyptian art, the distinction between olive baboons and other representatives of the same genus, i.e. *Papio hamadryas* (L., 1758), is made possible mainly through an evaluation of the typical rendering of the angled tail, as well as the coat colour and the lack of the mantle.

Saharan baboons

The olive baboon also includes some populations in the southern mountainous massifs of the Sahara (Le Berre, 1990), from where it has been reported in the remote mountains of Aïr (Niger), Tibesti (Chad), Manakaoki (Thomas, 1925), or Wadaï and Ennedi (Chad) (Bourbon, 1932; Dalloni, 1935; Dekeyser, 1950 and 1952; Dekeyser & Derivot, 1959; Hill, 1966; Gillet, 1968; Haltenorth & Diller, 1977; Le Berre, 1990; Bousquet, 1992). More specifically, according to Malbrant (in Dekeyser, 1955), in Chad baboons are not found beyond the northern limit of diffusion represented by the 13th parallel, while they extend eastwards as far as Tibesti through the Ouadaï and the Ennedi. In Aïr, the species only lives in the massif of Tamgak (wadies and mountains) (cf. Hall *et al.*, 1971). The isolation

which this extreme northern population has undergone gives it great biological significance. The feeding habits of the Aïr olive baboons are in fact mainly based on the consumption of dates from the dom palm, *Hyphaene thebaica* (L.), and, to a lesser extent, fruits of *Acacia* sp. and other plants (Bousquet, 1992). In this regard, an interesting fact emerging from Keimer's (1939) discussion of the baboon and the dom palm is that the fruit of the tree were called "nuts" in ancient Egypt and was considered as a nourishing food. Its importance is emphasised by numerous artistic representations showing baboons with sacks of dom fruit and climbing trees (cf. Osborn & Osbornová, 1999).

In their northernmost range of distribution, olive baboons extended beyond the southern borders of the Western Palaearctic, having been formerly reported from Tibesti. This is an isolated mountainous massif, about 3,500 metres in height (Petraghani, 1928; Brown, 1965), which is located in the middle of the Sahara desert between about 19°N and 24°N. Due to its geographical position, the entire region falls within the confines of the western Palaearctic, together with the rest of the Sahara south of the northern borders of the Sahel area (cf. Vaurie, 1959-1965; Cramp, 1977). In the early 1950s, a subspecies of olive baboon was described from Tibesti as *P. anubis tibestanus* Dekeyser & Derivot, 1960 (Dekeyser, 1952).

Tibesti baboon, *Papio anubis tibestianus* Dekeyser & Derivot, 1960

Western scientists were not informed of the existence of a population of these monkeys in the mountainous area of Tibesti until around the end of the 19th century (Lavauden, 1926; Petraghani, 1928; Dalloni, 1935; Dekeyser, 1952 and 1955; Dekeyser & Derivot, 1959; Beck & Huard, 1969). The history of baboons in this region is still far from being well known. According to Hufnagl (1972), the German explorer Gustav Nachtigal was the first scientist to reach the mountains of Tibesti around 1870, and he nearly died in the attempt. He reported the existence of monkeys there in the extreme south of Libya (Hufnagl,

1972). Later on, little by little, more information was gathered, and in 1926 Lavauden observed that in the region of Tibesti: "... *Colonel Tilho assured us that there were cynocephali there*", possibly attesting the occurrence of baboons in this Saharan region for the first time. A few years later, Petragnani (1928) again referred to the occurrence of these primates in Tibesti, and in particular in the vicinity of the town of Zouar, located in the foothills of the western slopes, along the valley of "Enneri Durso". In 1952 Dekeyser identified the only skull of baboon then known from Tibesti (cf. Hufnagl, 1972). Its type specimen was preserved at the Institut Français d'Afrique Noire (CG. IFAN 44-24-5), and consisted in one skull with mandible, obtained from an unnamed site

located between Zouarkè and Kachem. This specimen had already been presented to the Première Conférence Internationale des Africanistes de l'Ouest in Dakar in 1945 by J. Bigourdan (1950), but was only later described by Dekeyser (1952). In 1957 two young French explorers, Carl and Petit (1954) collected specimens of the Tibesti baboon in the western range of the Saharan mountainous massif, again near Zouar, and in 1960 Dekeyser and Derivot described the new material as a short-tailed subspecies of the olive baboon, i.e. *P. anubis tibestianus*. A skull of this rare *taxon* was given by Mr. Kenneth Guichard to the Museum of Natural History of Tripoli (Hufnagl, 1972) (Fig. 4). The inscription on the label has faded but it is still possible to read the date 1953, or perhaps 1958.

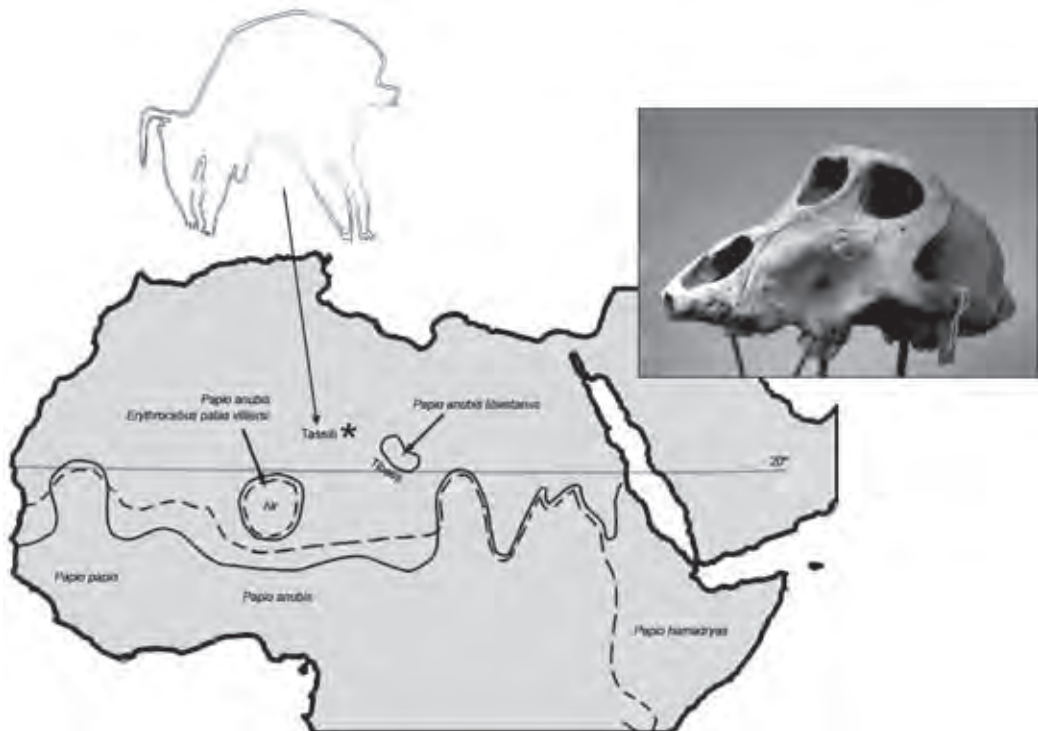


Fig. 4 - Present distribution of olive baboons and patas monkeys in north-central Africa, with the location of the mountainous massif of Tibesti, former homeland of *Papio anubis tibestanus*. Above left, the artistic illustration of a male baboon from the rock shelter of Tin Aboteka, located in south-western Tassili n'Ajjer, and stylistically referred to the archaic phase of the Round Head paintings. Above right, the skull of the Tibesti baboon on display in the Museum of Natural History of Tripoli, Libya (photo Marco Masseti).

Groves (2005) places *P. a. tibestianus* among the synonyms of *P. anubis*. It is possible that the Tibesti subspecies survived in some remote wadies of the geographic area of the same name up to the end of the 1960s. In fact, up to 1969, Beck & Huard (1969) still reported that: “*Le Teda, qui les appellent dongo ou dounbou, racontent parfois qu’ils descendent d’hommes qui ont été ainsi transformés par Dieu pour avoir fait preuve de lâcheté*” (=“The Teda, who call them *dongo* or *dounbou*, sometimes claim that they derived from humans and were thus transformed by God because they had shown cowardice”). According to Dorst & Dandelot (1973) and Halthenorth & Diller (1977), baboons were still reputed as occurring in the Tibesti mountains in the 1970s. As a general note however, lack of research in a region does not mean necessarily that relic populations are now extinct.

Note on the ecology of Tibesti

Despite its geographical location in the Saharan desert, the region of Tibesti is still characterised by peculiar ecological conditions which, up to few decades ago, consented the survival of the aforementioned baboon population. This was apparently a residual population from the period in which this part of the Sahara had more suitable environmental and climatic conditions. In this regard, it is interesting to note that the parallel of Tibesti (20°N) appears to play the role of biogeographical threshold, since it also marks the northernmost limit of the natural dispersion of several plant species, such as the *Higligh* or “elephant tree”, *Balanites aegyptiaca* (L.), and the dom palm, *Hyphaene thebaica* (L.) (Petraghani, 1928).

Formed of eroded volcanic rocks (Pritchard, 1979), the pinnacled landform of Tibesti is still characterised by a residual vegetation of conifers and other shrubs as a remnant of the limited southwards expansion of the Mediterranean vegetation in the course of the last glacial episode (Brown, 1965). Since the ancient Holocene, however, the Mediterranean vegetation has been influenced by the effect of arid degradation. The borderline with the xerophile vegetation of tropical type, such as several representatives of the genus *Acacia*, *Tamarix*,

Ficus, and *Myrtus*, appears to be located around the southern slopes of Tibesti up to the middle Holocene, albeit with some intrusions further north (Sansoni, 1994). Proceeding hand-in-hand with the process of aridification, which revealed a brusque acceleration in the late 4th millennium BC, the tropical vegetation spread to the north, progressively relegating the Mediterranean species to the higher parts of the mountainous massifs, where several specimens, regarded as multimillennial, have survived up to the present day (Sansoni, 1994). In fact, together with the endemic *Ficus teloukat* Battand & Trab., 1912 which grows on the south and south-western slopes, the Saharan mountainous vegetation of the upper reaches supports typical Mediterranean elements, such as *Nerium oleander* (L., 1753) on the wetter northern slopes (White, 1983). Archaeological evidence suggests a shift to the north of the borderline of the African savannah during the humid period of the Holocene, probably in the 7th millennium BP (5th millennium BC) (Balout & Roubet, 1980). Remnant tropical and Mediterranean plant species can be found throughout Tibesti, including palms, *Hibiscus* sp. and *Rhynchosia* sp. Others are Saharan endemics with tropical or Mediterranean affinities (White, 1983). These species occur in the area because the climate was wetter during the Pleistocene and there was a continuous connection between this region, Mediterranean North Africa and tropical Africa. The past vegetation is documented by pollen grains found in the soils and sands of the desert and in the rock art of ancient people who depicted savannah woodland mammals, including African elephants, *Loxodonta africana* (Blumenbach, 1797), and various different species of bovids (Cloudsley-Thompson, 1984). Several elements of this Sudanese fauna were able to settle along the river valleys. The desert catfish, *Clarias lazera* Cuvier & Valenciennes, 1840, is an example of this Afrotropical fauna which extended its diffusion to the far North. Crocodiles, *Crocodylus niloticus* Laurenti, 1768, were also reported from the foothills of Tibesti (Duveyrier, 1864; Lavauden, 1926; Brown, 1965). Among the remnants of this sub-Saharan fauna we could also include the relic diffusion of baboons in Tibesti.

There is, however, evidence for a former occurrence of these primates in other Saharan areas too, such as the not distant mountainous masses of Tadrart Acacus (Libya) and Tassili n'Ajjer (Algeria).

The genus Papio in the archaeozoology of the Northern Sahara: Tassili n'Ajjer, Fezzan and Tadrart Acacus

Primates are very rare among the fossil and subfossil materials provided by the archaeological investigation of the Sahara desert. We have already mentioned the few Neolithic bone remains of *M. sylvanus* yielded by some Algerian sites. Instead, osteological fragments from Holocene deposits in Dakhla Oasis (Libyan Desert, Egypt) that were initially recorded as “? monkey *Cercopithecus*” by Churcher *et al.* (1997) have since been identified as *Felis silvestris* Schreber, 1775 (cf. Osborn & Osbornová, 1999).

Scientific investigation provides evidence regarding the ancient Saharan dispersion of baboons. It seems, in fact, that in former chronologies of the Holocene, these animals also inhabited several territories located in the mountain ranges of the Tassili n'Ajjer (Algeria) and the Tadrart Acacus region in south-western Fezzan (Libya). Not unlike Tibesti, these areas too have been characterised by an indubitable richness of flora and fauna up to very recent times. Even in the first half of the last century, according to Lavauden (1927 and 1930), in the inner part of Tassili n'Ajjer, “dans la vallée de l'Oued Ihmirou et les vallées adjacentes il existe des parties véritablement boisées” (= in the valley of Oued Ihmirou and in other adjacent valleys...there are truly wooded areas). A few dozen Saharan cypresses, *Cupressus dupreziana* A. Camus, 1926, representatives of Mediterranean vegetation in the mountains of central Sahara, still survive today in the surroundings of Tamrit (Borzatti von Loewenstern, 1982), and, albeit with a much more limited presence, on the mountainous massif of Ahaggar. These trees, some of them millennial, are now regarded as authentic living fossils that survive as best they can in the extreme climatic conditions of the region (Charco, 1999). Among the species

that currently exist within the distribution range of the Saharan cypresses, most significant from a biogeographical point of view are the Saharan olive tree, *Olealalperrini* Batt. & Trab., 1912, and the Saharan myrtle, *Myrtus nivellei* Batt. & Trab., 1912, both endemics of the mountainous complexes of the central Sahara and indubitably of Mediterranean origin (Charco, 1999).

Comprised, as noted above, within the political boundary of the Libyan Fezzan, the mountainous complex of Tadrart Acacus extends for 40 km west to east, from the plateau of Tassili n'Ajjer at the western border of the Libyan Sahara, and for 120 km north to south, from the southern slopes of Jebel Soda to the wells of El Uâr (Petraghani, 1928). Located between 24°N and 28°N, the Fezzan also falls completely within the boundary of the Western Palaeartic, as indicated by Ellermann & Morrison-Scott (1951), and Corbet (1978). Up to 1930, Scortecchi (1939, 1940) noted that typical Afrotropical elements were unknown from the territories beyond the mountains of Sêrdeles, the northernmost part of Acacus, but were however found in the adjacent basin of Gat. Pollen analyses carried out on several Holocene samples from Wadi Teshuinat (24°30'N 10°11'E), in the Tadrart Acacus, on the whole, testified a wetter climate and a denser vegetation than today (Trevisan Grandi *et al.*, 1998). They also documented a former time span, from 6500 to 5500 BP, characterised by a greater availability of water, sufficient to sustain a savannah-like vegetation, followed by a drier phase from about 5000 to about 3900 BP, when the process of aridification began to be evident and the vegetation came to be confined in favourable water-receiving habitats such as wadies. Over the last century, these southern Libyan territories have provided extensive archaeological records, associated with the human population spanning from the Mesolithic (9000-7000 bp) to historical eras (Di Lernia & Manzi, 2002). In particular, this area preserves many cave and rock paintings and drawings, enhancing the available information on the lifestyle of these human populations, their social structures and processes, their relationship with the territory and fauna (Mori, 1965). Although these territories of southern Libya have furnished

numerous osteoarcheological records, monkey bones are nevertheless very scarce. Some remains were originally described as *Cercopithecus aethiops* (Cassoli & Durante, 1974) at Uadi Ti-n-Thora, and dated at around 8000-8500 years bp (Gautier & Van Neer, 1977), but they have recently been classified as *P. cynocephalus* (L., 1766) (Gautier & Van Neer, 1977). Ordinarily referred to as the yellow baboon, this latter species is slimmer than *P. anubis*, and is now widespread in sub-Saharan Africa, from the river Zambesi to Tanzania, coastal Kenya and Somalia (cf. Hill, 1966; Kingdon, 2004; Groves, 2005). Thus, in its northern and easternmost diffusion, the yellow baboon extends through the territories of East Africa but is completely missing from the biogeography of the Sahara desert proper; as far as is known at present. It also appears to be practically unknown in Saharan palaeozoogeography. Up to a few years ago, however, various populations of baboons were still comprised within the scientific definition of this species. Only recently have several of these instead been assigned to different *taxa* (cf. Groves, 2001 and 2005). Considering, in fact, the extant range of the distribution of the North African representatives of the genus *Papio*, the taxonomic assessments clearly refer to the systematic single-species interpretation of the genus *Papio*, now split into at least five different *taxa* (cf. Groves, 2001). *P. cynocephalus* was also described by Gautier (1987b) in the fauna from Uan Muhuggiag in the Pasa collection at the Museum of Verona. A few osteological and dental fragments were further reported during an archaeological survey on superficial layers at the site of Uan-Kasa (sample TH 131), and again described as *P. cynocephalus* by Corridi (1998). According to Claudio Corridi (pers. com., 2007), the sample included one canine and two other undetermined osteological fragments. The find came from the site of Sennadar (24°54'N 10°28'E), where it was found in a shelter located in the wadi alluvium in the course of a surface survey in Acacus and Messak performed between 1990 and 1993 by the Italian-Libyan Archaeological Mission from the "La Sapienza" University of Roma. This material was supposed to be related to a chronological phase comprising between the Mesolithic period (Late Acacus) and the Middle Pastoral, but like the

majority of the finds emerging from the archaeological exploration of this area, it may be attributable to the seventh-sixth millennium BP.

More recently, a fragment of maxillary bone with a third molar was recovered at the site of Takarkori, again by the Italian-Libyan Archaeological Mission from the "La Sapienza" University of Rome. In line with the general morphology, and above all the main diameters reported for the African primates (Swindler, 2005), again it can only be assigned to the genus *Papio* (Bruner, unpublished data). Here, several burials have been identified in a rock shelter, and the specimen can be dated to the Mesolithic (9000-7000 ybp), or the early Pastoral (7000-6000). The former phase refers to hunter-gathering and fishing, with an economy largely based on the Barbary sheep *Ammotragus lervia* (Pallas, 1777). The latter phase is associated more with domestication and domestic caprine resources. Taking into account the dimensions and biogeographical ranges of the currently recognised baboon *taxa* (Groves, 2001), both the Takarkori and Uan Kasa specimens can be provisionally assigned to *P. anubis*. The same identification should be applied to the specimens formerly assigned to *P. cynocephalus* in the same areas or in similar archaeological contexts. Even if the presence of baboons in these areas is further confirmed, it nevertheless appears that there was no relevant relationship with the human settlements. It remains to be investigated whether or not these primates were associated with human activities (hunting, pets), and whether they were introduced from other regions or represented residuals of the prehistoric and/or protohistoric baboon distribution.

Representation of primates in prehistoric Saharan art

Indirect evidence of the former occurrence of primates - and in particular of baboons - in Saharan zoogeography is also furnished by artistic productions, although such representations are few (cf. Gautier, 1993). In reality, monkeys rarely figure in the iconographic records of local rock art. Carved representations of monkeys at Hadjrat Driess (Hachid 1992), and Djorf Meharr (Soleilhavou, 2003) have been recorded from the Atlas mountains.

The artistic illustration of a primate is also recorded from the rock shelter of Tin Aboteka, located in south-western Tassili n'Ajjer, along the Algerian slope of Oued Edjériou (see Fig. 4). The image consists of a large profile painted in a white colour with a red outline. It could easily be identified as the representation of an adult male baboon, portrayed with an aggressive attitude (cf. Napier & Napier, 1967; Despard Estes, 1991). Stylistically it has been included in the archaic phase of the so-called Round Head paintings (Sansoni, 1994). This production is stylistically well-defined, although its chronological location remains somewhat vague. The bulk of the production belongs to the period comprised within the "Neolithic Wet Phase" (c. 4500-2500 BC) and before the "Postneolithic Arid Phase" (c. 2500-1000 BC) (Muzzolini, 1989). Thus, Round Head paintings can be chronologically located between the unspecified commencement of human settlement of the last Saharan humid phase (dating perhaps to the 8th millennium BC) and the arid pulsation of the 6th millennium BC which, according to Sansoni (1994), anticipates the advent of the food production economy on a large scale. It is also interesting to note the elevated affinity between the zoological species represented in the Round Head artistic productions (Kunz, 1988; Muzzolini, 1989; Sansoni, 1994) and the osteological material provided by the archaeological exploration of the contemporary sites of the Libyan desert, in the Fezzan-Acacus (Cassoli & Durante, 1974; Gautier & Van Neer, 1977; Gautier, 1987a, 1987b and 1993; van der Veen *et al.*, 1996; Corridi, 1992 and 1998; Alhaique, 2002). Characterised by a very old patina, and included in the earliest sub-group of the same artistic production, is the illustration of what is probably a baboon from the site of Tizzeine in Central Tassili (Muzzolini, 1989). Among the artistic productions of both Tassili n'Ajjer and Tadrart Acacus, few other representations of monkey related to the Round Head group are known.

There are other baboons - or pseudo-baboons, for some of them have human limbs, or even appear to be holding a bow - in the paintings of the

shelter of Oued Tirehart, in western Tassili (Kunz, 1988). The ethnozoological interpretations are not always univocal (Plate 8). At In Farden there is an alleged representation of a red monkey which is hunting, but the image is very stylised, and difficult to assess (Mori, 1965). This representation has been connected with the artistic context of the so-called Late Pastoral style. Close to this site, among the artistic production of the Round Head style, another monkey profile was initially recognised at Ti-n-ascig, but the image is more likely to be a large carnivore (Mori, 1960 and 1965). Carnivores and baboons are easily misinterpreted in rock art because of the many similarities associated with the body profile: enlarged chest, certain positions of the tails, the muzzle and the canines, and for some species also the mane. Nevertheless, it appears that a group of four baboons can be easily recognised in a wall drawing at the site of Teshuinat III (Mori, 1965), possibly dating to the Middle Pastoral (6000-5000 ybp). The mane and sexual characteristics suggest that the first is an adult male, followed by three juveniles or females (Plate 8). Mori (1965) interpreted the images as hamadryas, remarking that although these baboons live in sub-desert rocky habitats their presence in Acacus rock art is fairly rare. In any case, in terms of biogeography they can most probably be interpreted as *P. anubis*. More generally, one can observe that, among the few certain images of monkeys in Saharan art, it appears that the only species portrayed was the olive baboon. Muzzolini (1989) is of the opinion that in Round Head art these monkeys are to be regarded as "symbolic" animals.

Hamadryas baboon or sacred baboon, *Papio hamadryas* (L., 1758)

French: hamadryas
 Spanish: hamadriade
 Italian: amadiade
 German: Mantelpavian

Olive baboons are absent from north-eastern Africa (Ogaden, northern Somalia) (Funaioli, 1971; Haltenorth & Diller, 1977; Yalden *et al.*,

1996). These territories are, instead, the homeland of another representative of the genus *Papio*, the Hamadryas baboon or sacred baboon, *Papio hamadryas* (L., 1758), dispersed in the arid zone of the Red Sea coast of Sudan, Eritrea, Ethiopia and northern Somalia (Hill, 1970; Funaioli, 1971; Haltenorth & Diller, 1977; Al-Safadi, 1994; Yalden *et al.*, 1996; Groves, 2005). This species occurs in two populations which are now completely separated by the Red Sea. In fact, it is found both in Africa and in Arabia, where it lives in the mountainous south-western corner of the peninsula, occurring on the Red Sea hills in south-western Saudi Arabia and western Yemen, particularly near Aden (Thomas, 1900; Elliot 1913; Starck and Frick 1958; Harrison, 1964; Kummer *et al.*, 1981; Nader, 1990; Harrison & Bates, 1991; Al-Jumaily, 1998). This was also one of the species of monkey best known in antiquity. It has at length been believed that the diffusion of hamadryas in Arabia may have been related to their importation from the opposite coast of Africa from at least the time of ancient Egypt (see Kummer *et al.*, 1981). This is the only species of baboon taken into consideration by Ellermann & Morrison-Scott (1951), but, as the authors explain, their work on the Palaearctic and Indian mammals is limited to the African territories located north of the 20° parallel, although they deal with the whole of the Arabian peninsula. Corbet (1978) also regards the hamadryas as the only baboon occurring in the Palaearctic region.

We are dealing with a species whose natural distribution now appears to be limited to the north by the 20°S parallel, which – as mentioned above – is regarded as the southernmost limit of the Western Palaearctic unit. It has, however, been suggested that in antiquity hamadryas baboons were dispersed further north, up to the territories of Sudan, Nubia and even Egypt. The latter country is also regarded as the “type locality” of the species (Napier, 1981; Groves, 2001 and 2005), even though sacred baboons have long since vanished from these territories. In any case, Linnaeus described the *taxon* in his *Systema Naturae* (1758) through the examination of specimens from “Egypt” and “Upper Egypt” (cf. Groves, 2001).

The sacred baboon of ancient Egypt

Smith (1969) estimated that the sacred baboon became extinct in Egypt by the third millennium BC or the First Dynasty. According to Arnold (1995), it vanished from the wild during the Middle Kingdom (2134-1785 BC): thereafter baboons continued to be imported from the south. Kummer *et al.* (1981) are of the opinion that it is quite likely that the Egyptians imported these animals from African latitudes further south than their own country. In any case, no fossil remains of the species have been found in Egypt and there is no definite knowledge of its ancient distribution. The baboon cult, however, apparently began in the Predynastic period when it seems that this primate existed in Egypt (Osborn & Osbornová, 1999). It is believed that hamadryas were generally kept in temples and embalmed. They rarely became pets, because of their aggressive nature (cf. Erman, 1894; McDermott, 1938). Representation of sacred baboons is found in artistic production from the Protodynastic chronologies (end of the 4th millennium-2695/2640) up to the Christian era, in which period the worship of the baboon persisted (Osborn & Osbornová, 1999). Particularly famous are the hamadryas evoked in the wall-paintings of Tutankhamun’s burial chamber, where they are supposed to guard the young pharaoh as he passes through the 12 sections of the underworld on the first night after his death (Plate 9).

It appears that the major period of primate importation was the New Kingdom, which began with the XVIII Dynasty (second half of the 2nd millennium BC) (Osborn & Osbornová, 1999). In several artistic productions of this period, it is possible to detect the southern origin of the imported monkeys, which were normally brought from Nubia (i.e., the wall-paintings of the tomb of Rekhmire at Thebes) and the land of Punt (i.e., the reliefs of the tomb of Queen Hatshepsut at Deir el-Bahari). It is not known whether Punt lay on the African or the Arabian coast. Its location is supposed to be along the two shores of the Straits of Bab el Mandeb, at the end of the Red Sea, and along the coast of north-

eastern Somalia and southern Arabia (Osborn & Osbornová, 1999). Punt, according to Erman (1894), “*evidently signified the more tropical coast lands of the Red Sea, the south of Arabia, and the Somali coast*”.

According to Osborn & Osbornová (1999), information regarding primate mummies is somewhat confusing, mainly because of the lack of supporting data. Various authors, including MacDonald (1965), and Rabb (1968), stated for example that thousands of hamadryas had been mummified because they were so highly venerated and respected. Others, such as Brunner (1969), remarked on the findings of thousands of mummified ibises at Saqqara that brought the species close to extinction and “*similar fates befell the cats in Bubasti ... and baboons in Tuna el Gebel*”. Boessneck (1988), however, noted that the baboon mummies were in any case much fewer than the ibis mummies, for in the Late Period no more baboons of either species were imported and they were no longer kept in temples.

The Arabian sacred baboon, Papio hamadryas arabicus (Thomas, 1900)

Arabian baboons have been provisionally ascribed to *Papio hamadryas arabicus* (Thomas, 1900) (Ellermann & Morrison-Scott, 1951; Harrison, 1964; Corbet, 1978; Harrison & Bates, 1991). This subspecies was created by Thomas (1900) on the basis of the examination of an adult female specimen collected, on 16 October 1899, in Subaihi Country, about 60 miles north-west of Aden at an altitude of 1000 metres a.s.l.. Its type specimen is still conserved in the collection of the Natural History Museum of London, (BMNH 99.11.6.1). According to Harrison (1964), the material available is, however, hardly adequate to assess the validity of the Arabian race, although it is possible that it may perhaps be distinguishable by an, on average, smaller size and smaller cheek-teeth. In a preliminary study of the behaviour and ecology of four Arabian sacred baboon populations in south-western Saudi Arabia, Kummer *et al.* (1981) also concluded that the animal should not be considered a separate subspecies from the north-east African one. The Arabian hamadryas

is, however, the only baboon whose range extends beyond continental Africa (cf. Napier & Napier, 1967). According to Haltenorth & Diller (1977), the hamadryas is dispersed in the mountainous areas along the coasts of the south-western and southern regions of Arabia and Yemen, about 20° N to about 50° E (Nader, 1990; Al-Jumaily, 1998). In the peripheral hills of these areas, the baboon has recently become abundant (Corbet, 1968; Harrison & Bates, 1991). In fact, its distribution is strongly influenced by the availability of food, water, and safe havens (Al-Safadi, 1994). Thus, it is the only large mammal that can be considered to be over-abundant, causing problems to farmers and local people (Abuzinada *et al.*, 2002). The relative abundance of baboons is not affected by the presence of predators. However, no troops have been recorded from northern Yemen (Al-Safadi, 1994). There is also evidence for the occurrence of sacred baboons on some of the islands of the Red Sea, such as the Farasan archipelago. A complete skull with mandible of a subadult female of the species was in fact discovered in a provisional burial on Farasan Al-Kebir, the largest island of the archipelago (Fig. 5). This island is located opposite the south-western coast of Saudi Arabia, some 50 km offshore from the town of Jizan, at 16°42'21"N 41°59'0"E. The sacred baboon skull was collected in April 1984 by the Italian zoologist Benedetto Lanza, in the course of the joint mission of the Gruppo Ricerche Scientifiche e Tecniche Subacquee of Florence and the Feal Costruzioni of Milan, which was building a hospital there at the time. The specimen is now preserved in the collections of the Museum of Natural History of the University of Florence, Zoological Section “La Specola”, under catalogue number MZUF 11329. A transfer of pets by humans is the most likely explanation of this occurrence of a hamadryas baboon on Farasan Al-Kebir.

Regarding the present disjunction of the range of the hamadryas, the Red Sea acts as an extrinsic barrier to gene flow between continental and peninsular hamadryas populations (Wildman, 1999). But Kummer *et al.* (1981) observed that there is at present no evidence of a genetic difference between Arabian and Afrotropical hamadryas

baboons. There is no north-south gradient of morphology or behaviour in Saudi Arabia that could give a clue as to where the two populations had their most recent contact. The most recent land bridge across the straits of Bab el Mandeb, at the southern end of the Red Sea, existed around 12-10,000 years ago (cf. Bailey *et al.*, 2007), and even then it may have been a salt desert difficult for baboons to cross. Moreover, the absence of *P. hamadryas* from Oman suggests an African origin of the species. Looking for a more recent possible exchange, there is a theory that hamadryas baboons were imported by the ancient Egyptians, to whom they were sacred, from the land of Punt. As already mentioned, it is still unclear whether Punt lay on the African or the Arabian coast of the southern Red Sea, but in either case it is probable the sacred baboon was transferred from one coast to the other (Kummer *et al.*, 1981). Over recent decades, other biological elements of Afrotropical origin, such as the guinea fowl, *Numida meleagris* (L., 1758) and the lesser kudu, *Tragelaphus imberbis* Blyth, 1869, have also been reported from Arabian zoogeography. The occurrence of the

African galliform is restricted to the south-western portion of Arabia (Silsby, 1980; Gasperetti, 1981), but the lesser kudu was an African ungulate unknown in the Near East until Harrison (1972) and Büttiker (1982) recorded two separate specimens: the first from Yemen and the second from the Medina province (Saudi Arabia). This ungulate inhabits the arid thornbush country areas of East Africa from Ethiopia to Tanzania, up to 1300 m (Funaioli, 1971; Haltenorth & Diller, 1977), and, as of today there is no palaeontological evidence of its ancient presence in south-western Asia. Thus, as in the case of the guinea-fowl, it could be possible that the lesser kudu was previously introduced from East Africa to Arabia as a game animal (Borzatti von Löwenstern & Masseti, 1991). Kummer *et al.* (1981) is of the opinion that ancient vessels, or even a more recent transfer of pets by humans, might still be the most likely explanation of the occurrence of hamadryas on both Red Sea coasts. However, recent genetic analyses, performed by Lawson Handley *et al.* (2006), confirmed no significant difference between the African and Arabian populations

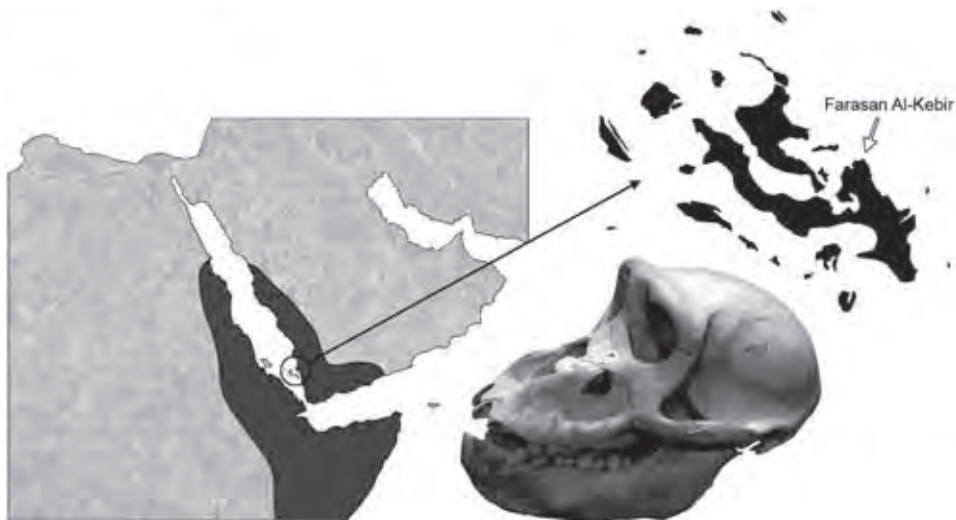


Fig. 5 - Sacred baboons occur in two populations which are completely separated by the Red Sea, being found both in Africa and in Arabia. There is also evidence for the occurrence of this species on the Farasan archipelago, where a complete skull was discovered on Farasan Al-Kebir, the largest island of the archipelago ($16^{\circ}42'21''N$ $41^{\circ}59'0''E$) (photo Saulo Bambi; courtesy Museum of Natural History of the University of Florence, Zoological Section "La Specola").

examined during the study. Consequently, it is unlikely that the low level of variation on the Y chromosome found in Arabia was caused by a population bottleneck during the colonisation of Arabia by African hamadryas baboons.

Some years ago, Wildman (1999) used mitochondrial DNA sequences and nuclear short tandem repeat genotypes to estimate the dates of dispersal of African hamadryas populations onto the Arabian peninsula. The results of this study included sequences and genotypes of hamadryas baboon populations from Yemen, Saudi Arabia, and Ethiopia, as well as data from appropriate papionin outgroup *taxa*. Genetic data were analysed using phylogenetic and population genetic techniques, and the analyses suggested that a dispersal onto the peninsula occurred during the Middle Pleistocene. When combined with geological, climatological, biogeographic and historical evidence, the results raise several points of discussion. Hamadryas baboons were not introduced onto the Arabian peninsula by Egyptians or other historic human groups. The animals may have instead dispersed across a now submerged isthmus at what today are the straits of the Bab al Mandeb at the southern end of the Red Sea, rather than across the Sinai peninsula. Thus, it seems that humans were not the only primates to migrate out of Africa during the Middle Pleistocene (cf. Rook *et al.*, 2004).

**Patas monkey or red monkey,
Erythrocebus patas (Schreber, 1775)**

French: *patas, singe rouge*

Spanish: *patas, mono rojo*

Italian: *eritrocebo, scimmia rossa*

German: *Husarenaffe*

These are highly distinctive medium-sized monkeys, with long limbs and a slender build (cf. Haltenorth & Diller, 1977; Kingdon, 1994). *Erythrocebus patas* (Schreber, 1775) is a Sahelo-Sudanese species, some insularised populations of which subsist in the Sahara (Hill, 1966; Le Berre,

1990). Since only a single species of *Erythrocebus* is now recognised, the geographical range is the same of that of the genus (Hill, 1966). Their distribution ranges from the Sudanese zone of Senegal and Mauritania to the Upper Nile and the Atbara in the east (northern border between 18° and 15°N, southern limit in the west and centre around 10°N, in the east around 3°S; Haltenorth & Diller, 1977; Groves, 2005) (Fig. 6). Hill (1966) recognised at least four subspecies of this *taxon*: *Erythrocebus patas patas* (Schreber, 1775), *E. patas villiersi* (Dekeyser, 1950), *E. patas pyrronotus* Hemprich & Ehrenberg, 1829, and *E. patas baumstarki* Matschie, 1905, the latter form being confined to a restricted area on the south-eastern shore of Lake Victoria. However, according to Groves (2001), the taxonomy of this species is still imperfectly known: subspecies may exist, but at least some of the features that allegedly characterised them were based on changes in the female's facial patterns during pregnancy. The subspecies *E. patas patas* Schreber, 1775, commonly called the West African red monkey, ranges for example to the north-east onto the Ennedi plateau (north-eastern Chad), and as far north as the Mourdi depression. It has also been reported in the northern part of Ubangi (Hill, 1966; Napier, 1981). Patas monkeys are apparently capable of surviving for long periods without water. Mason (1936), for example, shot one specimen north of Wadi Hawar, in north-western Sudan, and also found skulls of the species in the area "...hundreds of miles from any water".

According to Osborn & Osbornová (1998), patas monkeys probably existed in Egypt, in what is now desert, into the early dynasties (end of the 4th-3rd millennium BC). They were perhaps popular as pets during the dynastic period, but their alleged artistic reproductions are difficult – or almost impossible – to distinguish from those of other long-tailed monkeys. The archaeological evidence is also scarce. Kessler (1989), for example, listed only one patas monkey from the Late Period (beginning of the 2nd-1st millennium BC) animal necropolis in Dendera. The Greek poet Aelian (*c.* 170- after 230 AD) left us a fascinating and accurate description of the

external morphology of this animal: “*In his writing about the Red Sea Pythagoras says that there is an animal that lives on the shores and is called Kêpos. And it is well-named (kêpos, garden), for it is of many colours. When full-grown it is the size of an Eritrean hound. But I wish to return to the subject of its varied colouring and to describe it as he writes. Its head, its back, and its spine down as far as the tail are pure red, though you may observe a sprinkling of golden hairs. But its face including the cheeks is white, and from there golden stripes descend as far as the neck. The lower portions down to its chest and its forefeet are all white; its two breasts, which would fill your hand, are dark, but its belly is entirely white; its hind feet are black*” (On the characteristics of animals, XVIII: 8 [cf. Scholfield, 1959]).

Air patas monkey or Air red monkey,
Erythrocebus patas villiersi (Dekeyser, 1950)

Patas monkeys have also been recorded from between 15°-20° N (Napier, 1981). The semi-Saharan biocenoses of the Air massif region (Niger), in fact, still permits the survival of an isolated population of these monkeys, (Bousquet,

1992), which we feel must be included among the primates of the western Palaeartic. However, as noted above, we should not forget that Vaurie (1959-1965) and Cramp (1977) include the mountain massif of Tibesti include within the confines of the Western Palaeartic, but exclude those of Air (Niger) and Ennedi (Chad), due to the predominance of the Afrotropical biogeographical element in the latter territories. The Air population of patas monkeys was described for the first time by Dekeyser (1950) who indicated its members as belonging taxonomically to the new subspecies *Erythrocebus patas villiersi* (Dekeyser, 1950), commonly referred to as the Air patas monkey (Type Specimen: CG IFAN 47-10-165, ♂ adult) The type locality of this *taxon* is Irabellaben, where it was reported from an altitude of 1,200-1,300 m. Regarded as native to Air, the *taxon* is characterised, *inter alia*, by reduced dimensions compared to the nominal form and by longer canines (Dekeyser (1950 and 1955; Napier, 1981). Nevertheless Hill (1966) considered the exceptionality of these long canines as a possible individual anomaly. The Air population is isolated from the Sahelian range of the species

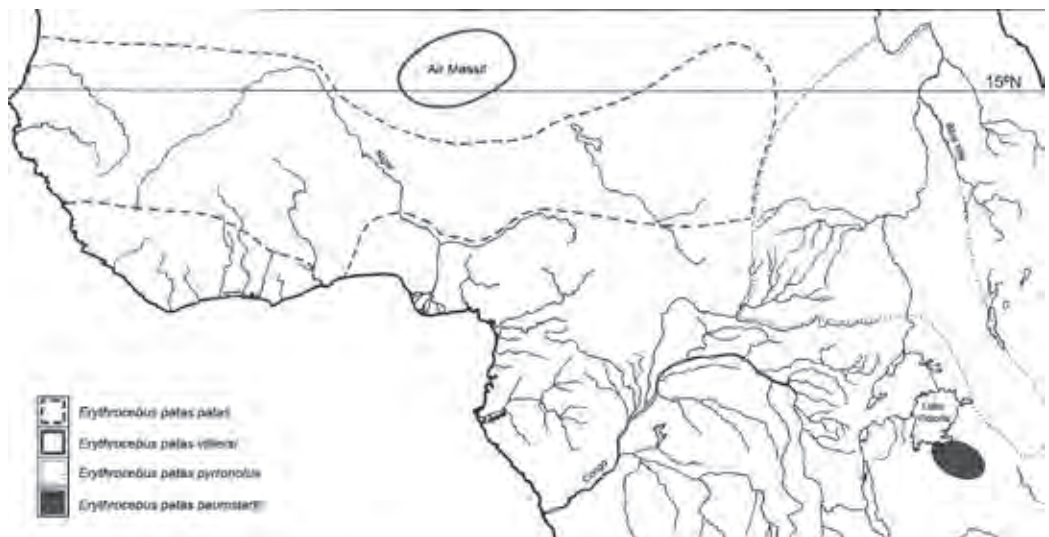


Fig. 6 - The distribution of patas monkeys ranges from the Sudanese zone of Senegal and Mauritania to the Upper Nile and the Atbara in the east; northern border between 18° and 15°N, southern limit in the west and centre around 10°N., in the east around 3°S. (from Hill, 1966).

and is itself composed of several discontinuous and isolated pockets (Dekeyser & Derivot, 1959). Dekeyser (1950) states that this monkey is common practically throughout the region of Air, inhabiting the larger valleys of the south. Its altitudinal range is between 600 m. a.s.l. at Dahaga and 1,600 m. on the plateau of Baguezans.

Nisnas, Nile patas, dancing red monkey or Blue Nile hussar monkey, Erythrocebus patas pyrrhonotus Hemprich & Ehrenberg, 1829

Another population of patas monkey has been reported from Wadi Hawar, in northern Darfur (north-western Sudan). Comprised between 15°N and 20°N, this basin lies near the border with Libya and Chad, between the junction of the east-west route linking the Sahara and the Nile Valley and the north-south route linking northern Africa and the Sahel-savannah belt (cf. Mohammed-Ali, 1981). As noted above, nisnas were found by Mason (1936) about 300 miles from the nearest open water. Hemprich & Ehrenberg (1829) ascribed it to the *taxon E. pyrrhonotus* (cf. Napier, 1981), but today it is regarded as an authentic full subspecies, *E. p. pyrrhonotus* Hemprich & Ehrenberg, 1829, dispersed from Sudan, Atbara and western Ethiopia to western Kenya and Uganda (Mason, 1936; Hill, 1966; Haltenorth & Diller, 1977; La Berre, 1990; Groves, 2005). The primate was described as having a completely white nose spot. Later, Pocock (1907) realised that the colour of the nose-spot varied with age and Loy (1974) mentioned the effect of the animal's reproductive condition upon this.

Green monkey or Cape Verde monkey, *Chlorocebus sabaesus* (L., 1766)

French: *singe vert, singe vert du Sénégal*

Spanish: *tota*

Italian: *cercopiteco gialloverde*

German: *Gelb Grünmeerkatze*

The taxonomic classification of guenon monkeys, or vervet monkeys, has recently been

updated, moving all the species from the genus *Cercopithecus* to a new genus, *Chlorocebus* (Rowe, 1996; Groves, 2001, 2005). There are now at least six representatives of this genus recognized at species level, with a geographical range extending over most of sub-Saharan Africa from about 18°-15°N, although excluding a large part of the south-western, southern and south-eastern continental landmass (cf. Haltenorth & Diller, 1977). In mainland West Africa, the northernmost limit of these monkeys was given by Rode (1938) as St. Louis at the mouth of the Senegal river. However, Galat & Galat-Luong (1977) recorded a population occurring slightly further north, on the island of Morfil (16°33'N 14°44, 5 E), located in the valley of the river Senegal, south of the village of Podor, near the border with Mauritania. Groves (2005) recognises the following species: the grivet monkey, *Chlorocebus aethiops* (L., 1758), distributed in Sudan east of the White Nile, Eritrea, Ethiopia east of the Rift Valley; the malbrouck, *C. cynosurus* (Scopoli, 1786), which spreads from the southern Democratic Republic of Congo to northern Namibia, and Zambia west of the river Luangwua; the Bale Mountains vervet, *C. djam-djmanensis* (Neumann, 1902), diffused over the highlands east of the lakes Abiata, Shalla and Zway, in Ethiopia; the vervet monkey, *C. pygerythrus* (F. Cuvier, 1821), dispersed in Ethiopia east of the Rift Valley, Somalia to Zambia east of the river Luangwua, and South Africa; and the tatalus monkey, *C. tatalus* (Ogilby, 1842), whose distribution ranges from the river Volta (Ghana) east to the White Nile (Sudan) and Lake Turkana (Kenya). Finally, the green monkey or Cape Verde monkey, *C. sabaesus* (L., 1766), is naturally distributed from Senegal to the river Volta (Ghana), also occurring on the islands of Cape Verde (Haltenorth & Diller, 1977; Groves, 2005) (Fig. 7). The latter is an archipelago approximately 500 km off the west coast of Africa at 15°02'N, 23°34'W, formed by ten main islands and about 8 islets which are divided into two groups: *Barlavento*, the northern island group, and *Sotavento*, the southern island group. Due to its location in the eastern Atlantic Ocean, this archipelago was not included by Ellermann & Morrison-Scott (1951)

and Corbet (1978) within the boundary of the Western Palearctic. But, as mentioned above, Vaurie (1959-1965), de Naurois (1969 and 1994), and Cramp (1977) suggest comprising it within the confines of this zoogeographical region in view of the evident Palearctic character of its avifauna. Several other authors, such as Coutinho Saraviva (1961), Sunding (1970 and 1979), Kunkel (1980), Ribeiro *et al.* (1980), Gonzales Henriquez *et al.* (1986), and Beyhl *et al.* (1995) have also expressed themselves in favour of the inclusion of these islands within the limits of the Western Palearctic.

C. sabaues was taxonomically separated from grivets, *C. aethiops* (L., 1758), as a full species by Kingdon (1997) and Groves (2001). Groves (2005) indicates the archipelago of Cape Verde as its *type locality (terra typica)*. In fact, the description of Linnaeus and the Latin name of the species, *Simia sabaes*, (*Systema Naturae*, 12th ed., 1: 38) were based mainly on a single specimen originating from the island of Santiago, which was published by George Edwards in his *Gleanings of Natural history* (1758-1764) (Osman Hill, 1966). Edwards (1758-1764) labelled his animal the "St. Jago Monkey" since it was brought to

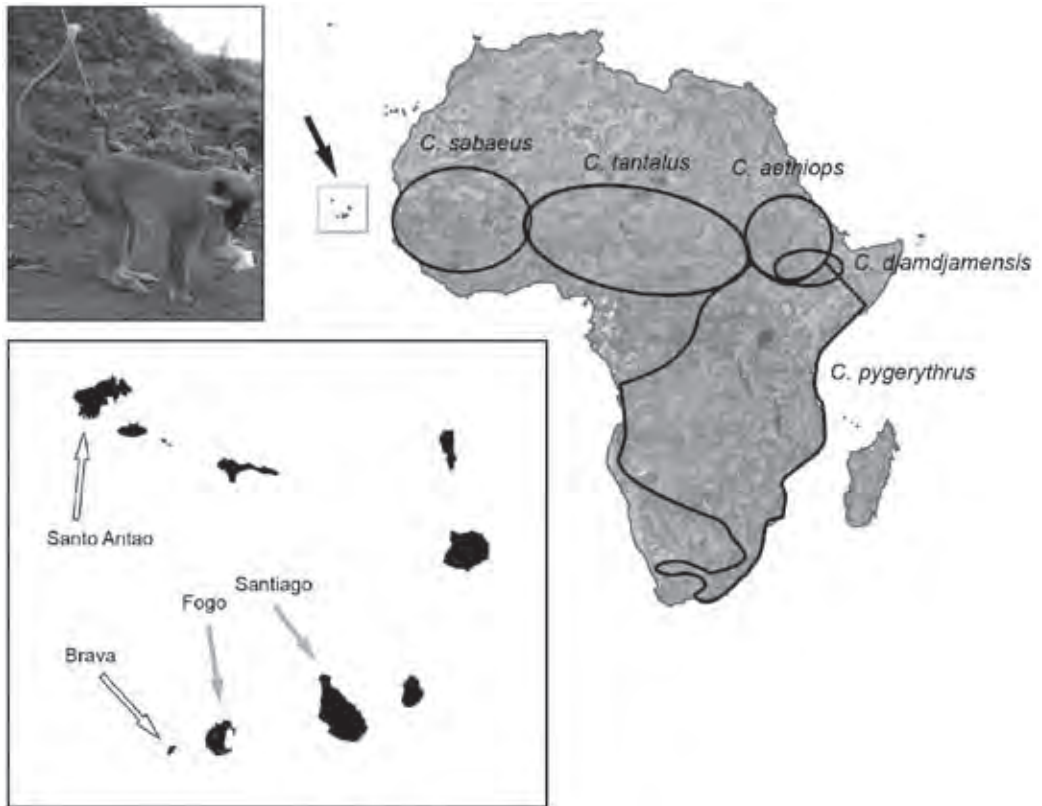


Fig. 7 - The continental distribution of guenon monkeys, or vervet monkeys, ranges from the territories south of the Sahara and the Sahel to southern Africa. Green monkeys or Cape Verde monkeys, *Chlorocebus sabaues* (L., 1766) (above left - photo Claudio Vergano and Paola Lovesio) were also introduced in historical times on the archipelago of Cape Verde (below left) where they are today present only on the island of Santiago and, perhaps, Fogo (grey arrows: current distribution; empty arrows: historical distribution).

England alive from one of the Cape Verde islands of that name (*St. Jago*) (Plate 10). The same author said that the sailors of his time generally referred to the green monkey as the “St. Jago monkey” because the animals were brought to England from St. Jago in Cape Verde. Later on, both Jardine (1833) and Goldsmith (1840) noted that green monkeys lived on the islands of Cape Verde. Ogilby (1838) confirms that the species to which the name came to be applied was that otherwise known as the green monkey and Cape Verde monkey. In the course of the 20th century, these primates were still reported from the Cape Verde islands of Santo Antão and Brava (Muzio, 1925), Brava and Santiago (Naurois, 1994; Hazevoet, 1995; Sorgial, 1995). More specifically, Muzio (1925) described these insular monkeys as “...a variety of little monkey (*cercopithecus saboeus*) to be found jumping around in the forests of Antao and Brava”. According to Naurois (1994), the sub-species occurring in the archipelago is *Cercopithecus aethiops sabaesus* (L., 1766) [= *Chlorocebus sabaesus* (L., 1766)]. Together with that of other exotic animals such as rats, sheep, goats and cattle, the introduction of this monkey too is considered to have had negative effects on the native flora and fauna of the archipelago.

It seems very likely that the green monkeys of Cape Verde were introduced there from the adjacent African mainland (Hill, 1966). In fact, it should be stressed that there is no trace of the osteological remains of these animals in Cape Verde Pleistocene deposits. Nor does it seem likely that *C. sabaesus* reached the Atlantic archipelago by swimming, jumping onto floating logs or other so-called sweepstake routes. It is thought that the primates were imported from continental Africa onto the Cape Verde archipelago no later than the mid-17th century (Napier & Napier, 1967), and perhaps even much earlier (Denham, 1987). In fact, in 1673 during a visit to the already mentioned island of *St. Jago*, Fryer (1909) met natives on the beach selling monkeys, “such green ones as are commonly seen in England to be sold”. According to Naurois (1994) and Sorgial (1995), the monkeys were imported respectively from Guinea and Guinea Bissau. Azzaroli Puccetti

& Zava (1988) are instead of the opinion that this importation occurred from Senegal towards the end of the 19th century. Naurois (1994) and Sorgial (1995) observed, however, that the monkeys were deliberately released in Santiago, while their release in Furna (Brava) was involuntary, the result of an accidental escape on the part of the animals. In any case, the monkeys cannot have been released on Cape Verde before 1462, the year of the discovery of the Atlantic archipelago by the Portuguese (de Vasconcelos, 1920; De Oliveira Boléo, 1939).

Today there are plenty of green monkeys in Santiago (Hazevoet, 1995; Payne, 2003), while those introduced into Brava have not survived (Hazevoet, 1995). A large colony of the primates lives in the palm grove behind the beach of Tarrafal, in the northernmost part of Santiago (Righetti, 2004). Green monkeys on Fogo are now kept as pets. Apart from Santo Antão, the former and present occurrence of green monkeys seems to be restricted to the islands of the southern group of the archipelago, the *Sotavento* group, possibly due to the more favourable climatic and environmental conditions, together with the presence of some wooded areas.

African green monkeys in the West Indies (Neotropical biogeographical region)

In the late seventeenth century, green monkeys were introduced into several West Indian islands, in the western Atlantic Ocean, when ships involved in the slave trade travelled to the Caribbean from West Africa (van der Kuyl *et al.*, 1996). Today, large feral populations of these primates live in Barbados, St. Kitts, and Nevis (Ashton & Zuckerman, 1950; Hill, 1966; Haltenorth & Diller, 1977), and small numbers have been reported from Sint Eustatius (Denham (1987) (Fig. 8). The islands of St. Kitts, Nevis and Sint Eustatius are clustered together near the northern end of the Lesser Antilles; Barbados is instead located about 600 km to the southeast of that cluster, about 150 km from Grenada and the Antillean Volcanic Arc, and about 4000 km west of the nearest point of Africa (cf. Denham, 1987). In some instances these monkeys have escaped

and are now living as wild populations on some of these islands, notably St. Kitts, one of the Leeward Islands (Ashton & Zuckerman, 1950), and Barbados (Hill, 1966). Specimens from St. Kitts are conserved in the collection of the Natural History Museum, London (BMNH), and the Odontological Museum of the Royal College of Surgeons of London (Ashton, 1959; Ashton & Zuckerman, 1950; Ashton & Zuckerman, 1951a; Ashton & Zuckerman, 1951b; Ashton & Zuckerman, 1951c; Colyer, 1948a; Colyer, 1948b; Napier, 1981; Sclater, 1866).

Caribbean-born African green monkeys were classified as *C. sabaues* also through cytochrome b sequencing (Pandrea *et al.*, 2006). Denham

(1987) suggests that these West Indian monkeys are of heterogeneous origin, coming not only from Cape Verde but also from continental West Africa. Their story is somehow connected with that of the early European settlements of St. Kitts, Nevis and Barbados, the African origin of West Indian slaves, and the transatlantic routes from the seventeenth century up to the nineteenth, and even earlier. We also have to consider the role of Barbados as a slave entrepot, the fact that monkeys were embarked as pets aboard ships and as trade goods sold to menageries in Europe and the New World. In this respect, it is pertinent to recall that there is clear evidence for the importation of other Old World mammals to the

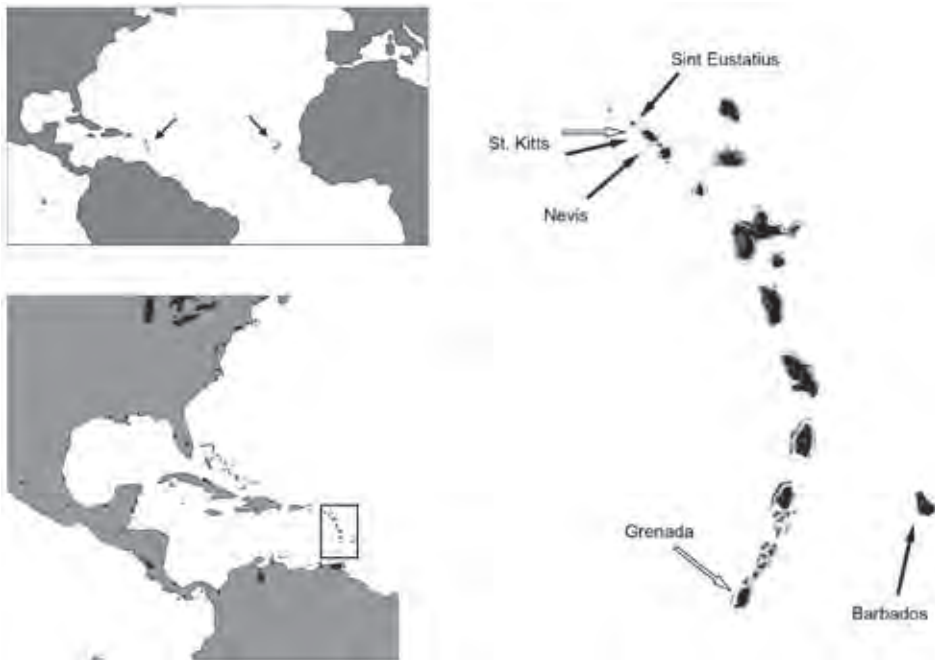


Fig. 8 - Location of the West Indian islands, in the western Atlantic Ocean, inhabited by African green monkeys (black arrows), and the Cape Verde archipelago, off the coast of western Africa. Following the trade of slaves from Africa, another species of African monkey reached these Neotropical islands in recent historical times: the mona monkey, *Cercopithecus mona* (Schreber, 1774) (white arrows). A population of mona monkey is reported from the Caribbean island of Grenada, in the Windward archipelago (Lesser Antilles) (Denham, 1987), where the species was probably introduced in the course of the eighteenth century (Napier, 1981). According to Haltenorth & Diller (1977), this species was also imported onto St. Kitts. In recent historical times, mona monkeys have also been introduced onto the Atlantic islands of São Tomé and Príncipe, in the Gulf of Guinea (Frade, 1956; Afonso-Roque & Santinho Barata, 1992).

West Indies, even of larger size. In fact, in 1857, Charles Darwin presented the British Museum (Natural History) with three skins of European fallow deer, *Dama dama dama* (L., 1758), from the island of Bartudee (Barbuda), near Antigua, providing the following information: “Domesticated and naturalised about 100-150 years ago on the Island of Barbuda” (Chapman & Chapman, 1980; Masseti, 1996). These skins are still preserved in the Natural History Museum of London (BMNH 57.1.14.1, BMNH 57.1.14.2, BMNH 57.1.14.3). The archipelago of Cape Verde was, indeed, a vital link in the British “triangle trade” (manufactured goods to Africa, slaves to the West Indies, sugar to England), and the Cape Verdians shipped salt and livestock directly to Barbados aboard English ships that did not go to Africa as part of the triangle trade (Duncan, 1972). Perhaps the green monkeys were introduced to Cape Verde between the 1460s when the Portuguese settlement began, and the 1620s when the British began to settle in Barbados (Denham, 1987). In any case, according to Denham (1987), if the Cape Verde islands served as the source of the monkeys that became established in the West Indies, it is possible that the West Indian populations arose from a much more narrowly circumscribed founder population than has previously been suspected.

There is also evidence, however, for an earlier beginning of the exportation of green monkeys beyond their natural distribution, i.e. towards Europe. The portrait, for example, of an adult individual of *C. sabaenus* depicted by the famous Florentine painter Andrea del Sarto in the frescoes of the Villa Medici of Poggio a Caiano, near Florence, around the end of the second decade of the 16th century, testify to an already established cultural habit of exporting these living primates out of Africa, even towards countries very far from the areas of their original distribution (Plate 11). The morphological rendering of the specimen of green monkey painted by Andrea del Sarto is so accurate that the painter was presumably very familiar with the subject portrayed, and may even have used a live specimen as a model (cfr. Veracini & Masseti, 2007). This

specimen must have been part of the menagerie of Pope Leo X who, like his late father Lorenzo de’ Medici, collected rare and exotic animals originating from all corners of the world (Bellori, 1931; Fontoura da Costa, 1937; Dacos, 1969, 1977; Clarke, 1986; cf. Masseti, 1991). A specimen of the same species of monkey figured later, in 1794, again in Florence, among the collections of the *R. Museo di Fisica e Storia Naturale*, from where it was transferred from the menagerie of the nearby Boboli gardens. It was listed under catalogue number 1129, with the name of *Simia sabea* (Sabean monkey) or *Scimmiotto verde* (= little green monkey).

Grivet, *Chlorocebus aethiops* (L., 1758)

French: *grivet*, *callitriche*

Spanish: *mono verde*

Italian: *cercopiteco grigioverde*

German: *Grünmeerkatze*

Kingdon (1997) and Groves (2001, 2005) recognised the grivet, *Chlorocebus aethiops* (L., 1758), as a separate species of the guenon monkeys, characterised by peculiar morphological patterns. Linnaeus (*Systema Naturae*, 10th ed., 1: 28) described this primate on the basis of the examination of specimens from “Ethiopia”. In effect, the *taxon* is regarded as an Afrotropical element, distributed in the savannahs and steppes south of the Sahara from about 18°-15° N, in Sudan east of the White Nile, Eritrea, and Ethiopia east of the Rift Valley (Hill, 1966; Haltenorth & Diller, 1977; Kingdon, 2004; Groves, 2005). In Ethiopia, south of the river Omo, it may cross with *C. pygerrhurus* (Groves, 2001). The recording of a savannah guenon from the Aïr massif on the edge of the Sahara by Bigourdan & Prunier (1937), followed by Dekeyser (1950) and Le Berre (1990), needs confirmation (Hill, 1966). The latter population was presumably regarded as being related to the form *C. aethiops tantalus* Ogilby, 1841. Subsequently, however, Dandelot (1959), Kingdon (1997) and Groves (2001) separated *C. tantalus* from *C. aethiops* at species level.

Museum collections from the Khartoum Province (15°34'N 33°36'E) suggest that grivets survived in Central Sudan until the beginning of the 20th century (Peters, 1989).

According to Hill (1966), in ancient times grivets extended their range much further north than at present. In fact, together with the Barbary macaque and the baboon, this was possibly the species of monkey best known in the ancient Mediterranean world. Grivets have been kept as pets since time immemorial and numerous examples have been exported out of Africa since antiquity. Vague accounts of an East African green monkey have circulated since the days of the ancient Greeks, who adopted the term *callithrix* (= “beautiful hair” [cf. Battaglia, 1962; Rocci, 1970]) originally introduced by Homer (Hill, 1966). *Callitriches* were also mentioned by Pliny the Elder who observed that: “*Hoc animal negatur vivere in alio quam Aethiopiae quo gignitur caelo*” (= It’s said that this animal can survive only in the climate of Ethiopia, where it comes from) (*Naturalis historia*, VIII, 216). Although the grivet is not – and perhaps never has been – a *taxon* naturally dispersed within the boundaries of the Western Palaearctic, there exists considerable archaeological evidence to

show that it regularly occurred – even, perhaps, as a naturalised species – in the Aegean region (eastern Mediterranean) in the course of the 2nd millennium BC. As far as is presently known, *C. aethiops* was imported there from Egypt as a precious gift, a luxury which the flourishing Late Bronze Age palace economy of the Aegean area could afford (cf. Masseti, 1997 and 2003b).

Grivets in ancient Egypt

Osborn & Osbornová (1998) are of the opinion that grivets were never actually considered as sacred in ancient Egypt, but were very popular as pets. According to Houlihan (1996) too, they figured among the animals that were kept as domestic pets. In the artistic production, these monkeys were in fact consistently depicted as more playful and less serious than the hamadryas baboons (Arnold, 1995). Very likely the species was completely absent from the territory of ancient Egypt, where it was however frequently imported from far afield, from the southern countries such as Nubia and the mythical land of Punt. These countries roughly correspond respectively to what is now northern Sudan and the territories of the so-called Horn of Africa (Ethiopia and Somalia), where grivets



Fig. 9 - Detail of a painted limestone relief from the mastaba of Ty at Saqqara, Egypt (Fifth Dynasty, 3rd millennium BC).

are still naturally dispersed. Arnold (1995) is, instead, of the opinion that *C. aethiops* survived in the wild in ancient Egypt at least up to the Middle Kingdom (2134-1785 BC), about the same time that the hamadryas baboon also disappeared. However, according to Osborn & Osbornová (1998), the importation of grivets from the south, as of other monkeys, doubtless began in the earliest dynasties, although they did not appear in art until much later. The earliest Egyptian portraits of grivets are known from the tombs of the nobles Ty, Ptahotep (Dynasty V), and Mereruka (Dynasty VI, 3rd millennium BC), at Saqqara, and from the tomb of Nefermat, Dynasty IV, at Medum (Osborne & Osbornová, 1999) (Fig. 9). Images of these monkeys are also found in the wall-decoration of several tombs of the 18th Dynasty (second half of the 2nd millennium BC), at Thebes (Masseti, 1980) (Plate 12 and 13). Grivets are again represented in the decoration of the temple of Ramses II, at Beit el Wadi south of Aswan (19th Dynasty). As far as is presently known, mummified grivets were listed by Kessler (1989) only from the animal cemeteries of the Late Period (end of the 2nd-1st millennium BC) in Thebes, Dendera, Tuna el

Gabal (Hermopolis) west of the Nile north-west of Mallawi, Madinet Gurob and Old Cairo. Two grivets were also recorded by Groves (2006) in the Ptolemaic-era catacombs al Saqqara, dating from after 300 B.C. In ancient Egypt, grivets were not popular only as household pets. In fact, they were also sent as gifts and traded to various parts of the Near East and the Mediterranean (McDermott, 1938).

The “blue monkeys” of the Minoan palaces

There is a considerable amount of evidence to show that grivets were also traded between eastern Africa and the eastern Mediterranean basin in the course of the 2nd millennium BC (Masseti, 1980, 1997, 2000a, 2003a, 2003b and Masseti, 2006). In the so-called “House of the Frescoes”, west of the palace of Knossos (Crete), for example, there is a remarkable series of paintings showing long-tailed monkeys and medium-sized birds, painted in an intriguing blue colour, set within a rocky landscape amidst streams, waterfalls and luxuriant vegetation (Late Minoan 1A, about 1550 BC, *Herakleion Museum*). Blue monkeys are a recurrent motif in the production of the Aegean Late Bronze Age artists. Their painted



Fig. 10 - Archaeological location of the Minoan sites that provided painted images of “blue monkeys”. On the upper left, the stone rashly claimed by Poulianos (1972) as the fallacious discovery of a *Chlorocebus* monkey skull, apparently found on the Aegean island of Santorini (Thera), in the summer of 1966.

images have also been discovered in Thera frescoes (Late Minoan IA, about 1630 BC *Athens, National Museum*; Plate 14), and in the paintings from the Pillar Crypt area on the island of Milos (cf. Morgan, 1990) (Fig. 10). These painted monkeys feature the unmistakable morphological patterns of the grivet, the exotic primate presumably imported from sub-Saharan Africa into the Aegean region through commercial trade with Egypt, where it was clearly also regarded as very precious (Masseti, 2003b and 2006; see also Groves, 2008). The value of the monkeys may have been related more to their curiosity appeal than to their effective economic worth, or possibly to both (cf. Masseti, 2001). These monkeys were deemed so exotic and important by the Aegean Bronze Age culture that they were not thought of simply as animals, but as creatures invested with the role of intermediary between the human and divine worlds (Marinatos, 1987; Evely, 1999). In the wall-paintings on the upper level of the building Xeste 3 of the late Bronze Age site of Akrotiri, on the island of Santorini (Thera), a “blue monkey” has been represented in a ritual context connected with the offering of crocus stigmas, *Crocus cartwrightianus*, to a goddess of healing presumably associated with saffron phytotherapy (Ferrence & Bendersky,

2004) (Fig. 11). On the other hand, the keeping of strange animals by the elite was a widespread phenomenon in contemporary Egypt and the Near East (Evely, 1999; Masseti, 2003b).

Morgan (1988) has observed that all the scenes in which the “blue monkeys” are depicted in Late Bronze Age Aegean art may reflect controlled environments, with those apparently set in the wild actually being located in parks. This is suggested essentially by the fact that, in view of their value and rarity, these monkeys had to be kept within an area controlled by humans (Masseti, 1997). Nevertheless, as already observed by Trantalidou (2000), despite the frequent occurrence of grivets in the artistic production of the Aegean Bronze Age, monkey bones are not reported from any sites in the Aegean. Poulianos (1972) rashly claimed the fallacious discovery of an alleged monkey skull, apparently found among sea pebbles and rocks on the east side of Santorini by the Greek archaeologist Galanopoulos, in the summer of 1966 (see Fig. 10). Since it was assumed that this item had been covered by the lava that erupted from the island volcano around the mid 2nd millennium BC, this was regarded as evidence of the fact “...that the specimen lived during the period when Crete was ruled by Minoans and was the



Fig. 11 - In the decoration of the building Xeste 3 of the late Bronze Age site of Akrotiri, on the island of Santorini (Thera), a “blue monkey” was represented in a ritual context connected with the offering of crocus stigmas, *Crocus cartwrightianus* Herb., to a goddess of healing presumably associated with saffron phytotherapy.

most powerful state on earth" (Poulianos, 1972). Poulianos (1972) even went so far as to indulge in a possible classification of the monkey, referring it to the morphology of the representatives of the Cercopithecidae family, and more specifically to a specimen of "*Cercopithecus callitrichus*" (cf. Rossi, 1968), as grivets were formerly classified (cf. Hill, 1966). The alleged "skull" was also identified as belonging to the species of monkey represented in the murals of Knossos. Subsequently, the affair was exposed as a complete fabrication, the article involved being simply a chunk of lava featuring a vague resemblance to the exterior of a monkey skull (Doumas, 2000).

In the Minoan wall-paintings of Knossos, Thera and Milos, however, the morphological



Fig. 12 - Detail of the Late Minoan IA wall-painting (c. 1550 BC) from the "House of the Frescoes" at Knossos, showing a "blue monkey" eating an egg from a wild pigeon nest (after Cameron, 1968).

rendering of *C. aethiops* is so accurate that the Aegean Bronze Age artists presumably knew the subject very well, and may even have used live specimens as models (Masseti, 1980). Beyond the morphological knowledge displayed, these artists also revealed a specific talent in evoking the behavioural characteristics of the animals that they were commissioned to paint (Masseti, 2000, 2003a, 2006). At Knossos, for example, grivets are depicted in the course of a raid in a nesting area of the rock doves, *Columba livia* Gmelin, 1789, which might explain why most of the "blue birds" were depicted in flight (Cameron, 1968; Masseti, 1997). In fact, one of the primates appears to be eating an egg (Fig. 12). The grivet is in fact often regarded as a species with a marked tendency to raid gardens, fields and plantations, often becoming a major pest (Haltenorth & Diller, 1977; Despard Estes, 1991). Similar behaviour has been documented in troops of sub-Saharan Africa (Masseti, 2000a, 2003a). Studies carried out on the West-African representative of the guenon monkey taxonomic group – the callitrix monkey, *C. sabaues* (L., 1766) of northern Senegal – demonstrated that these primates can develop the habit of preying upon birds and small mammals, such as columbiformes and murids respectively. Galat & Galat-Luong (1977) observed that this predation occurred in marginal habitats of the Sahelian zone, particularly in relation to species such as the palm dove, *Streptopelia senegalensis* (L., 1766), and the Nile rat, *Arvichantis niloticus* (Desmarest, 1822), in periods during which there was an epidemic increase of the latter species. According to Galat & Galat-Luong (1977), this type of behaviour may arise in the event of competition with rodents, leading *C. aethiops* to an increased consumption of animal food, including predation upon the Nile rats themselves. This provides scientific verification of the behaviour of the "blue monkeys" in the Knossos wall-painting (Masseti, 2000 and 2006).

Grivets in Europe

Began in very early times, the exportation of grivets beyond the territories of their homeland

has been carried out throughout history. Thus, for example, pictorial evidence of this monkey is also available among the figures in the 12th century floor mosaics of the cathedral of Otranto, in Apulia (southern Italy) (Willemsen, 2000). Some of the most intriguing images of the species produced in Italian art are also found in the works of 14th – 15th century artists such as Pisanello (cf. Cordellier *et al.*, 1996) and/or Giovannino de'Grassi (cf. Recanati, 2005) (Fig. 13). The occurrences of images of *C. aethiops* in the work of the 16th century Italian naturalist Ulisse Aldrovandi (V, a., c. 21) - still preserved in the Biblioteca Universitaria of Bologna (Italy) – provides evidence of the conspicuous trade contacts that still existed in the Middle Ages between Italy, Egypt and eastern North Africa (Capanna & Gippoliti, 2007) (Plate 16). Moreover, evidence of the popularity of these monkeys in the western world is underscored by the importance traditionally attributed to them since Medieval times. For example, it is interesting to note how the grivet was referred to in the pages of the *corpus aldrovandianum*: “*Cercopithecus mas Simia caudata Gatto Maimone vulgo*”. Here it is in fact specified that this long-tailed monkey was popularly indicated with the name *gatto maimone*. This term was borrowed from the Arabic *maimūn* to indicate the “green monkey”, and went on to become the Italian *mammone*, and/or *gattomammone*, a fantastic character in traditional fables, and also the ancient Italian *monna* and *monina (scimmia)* (= monkey) (Pellegrini, 1972). Also deriving from this term is the modern Spanish *mono* (= monkey). However, in other

European languages, the name given to the grivet comprises the acknowledgement of an overseas origin. Effectively, the English term *guenon* and the Latin *cercopithecus* are translated in German by the word *Meerkatze*, which literally means “the cat (*Katze*) of the sea (*Meer*)”.

Senegal bushbaby, *Galago senegalensis* (Geoffroy, 1796)

French: *galago du Sénégal*

Spanish: *gálago del Senegal*

Italian: *galagone del Senegal, moholi*

German: *Steppengalago*

It is possible that a relic population of Senegal bushbaby, *Galago senegalensis* É. Geoffroy, 1796, survived in some remote wadies of the Ennedi mountainous massif (Chad) up to very recent times. This species is a typical Afrotropical element whose distribution, according to Hill (1953), is limited southwards by the African forest belt and to the north by the Sahara. The Senegal bushbaby has only been reported once from Ennedi by Petit (1937), who observed it in the area of Archei (cf. La Berre, 1990). The region of Archei (16°20'–16°50'N 21°50'–21°00'E) is located in the western Ennedi, extending over an area of about 18,000 km². The territory is characterised by the presence of a large “guelta” - the so-called guelta d'Archei. This is a peculiar type of wetland, typical of desert regions, which is formed when groundwater in lowland depressions rises to the surface, creating permanent

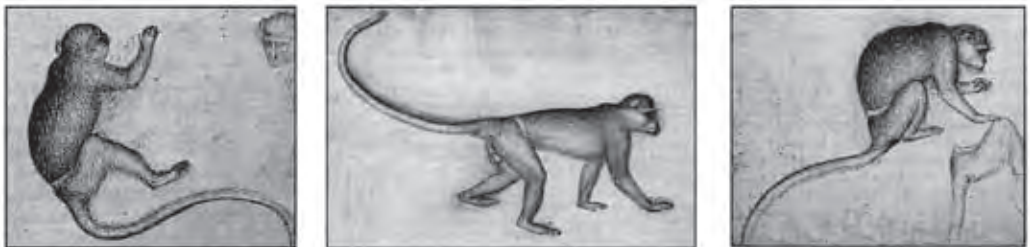


Fig. 13. Some intriguing drawings of grivets produced in Italian art in the 14th-15th centuries.

pools and reservoirs. The peculiar environmental conditions of the guelta d'Archei in fact still consent the survival of one of the last populations of Nile crocodile, *Crocodylus niloticus* Laurenti, 1768, known in the Sahara: another biological element characteristic of Afrotropical zoogeography. Moreover, following Petit (1937), Scortecci (1940) too mentioned the occurrence of *G. senegalensis* in Ennedi, regarding it as a: "[...] typical element of the Ethiopic zoogeographic region [...]", and also positing a hypothetical – albeit never confirmed – occurrence of the species in Tibesti. Nevertheless, neither Ellerman & Morrison-Scott (1951) nor Corbet (1978) include the Senegal bushbaby among the mammalian species of Western Palaearctic fauna.

Conclusions

While in many civilisations the role of the monkey is traditionally, invested with positive connotations, in Christian culture (predominant in the European/Mediterranean countries) the image of this animal has always tended to be negative. Monkeys were frequently taken to symbolise the evil or stupid side of human beings (e.g., Goves 2008, Herrero Marcos, 2006), which makes all the more intriguing the fact that Darwin's theory struck the heart of this cultural denigration of natural human origins. This cultural bias is very likely related to the lack of primatological fauna in most of the Western Palaearctic territories. Consequently, a study of the primates of this biogeographical region is rather unusual, since the *taxon* is hardly represented. The aim of the present paper is therefore twofold. Firstly, we have provided an overview of those species originally found in this geographical range. Secondly, we have emphasised the role of archaeological and ethnozoological records in enhancing the biogeographical and historical knowledge on this group.

The species described in this paper can be divided into four categories:

- 1) Naturally occurring primates: those *taxa* originally distributed in the Holocene biocenoses (*M. sylvanus*);
- 2) Borderline species: species of Afrotropical distribution, extending their ranges beyond the boundaries of this biogeographical unit (*P. anubis*, *P. hamadryas*, *E. patas*, *G. senegalensis*);
- 3) Species documented by archaeological evidence: *taxa* documented only by archaeological data (*C. aethiops*);
- 4) Anthropochorous species: species introduced by humans and subsequently naturalised (*C. sabaesus*);

In terms of "natural" biogeography, the Holocenic presence of monkeys in the Western Palaearctic is practically restricted to a single species, *M. sylvanus*. Furthermore, while its North African range is definitely a relic distribution, the European presence in Gibraltar is the result of human activity. In fact, we should recall that Gibraltar lies beyond the "monkey belts" recognised for the zoogeography of primates (Napier & Napier, 1985).

Most of the other species included in the present study tend to be distributed along the borders of the biogeographical unit in question. Olive baboons and patas monkeys are two examples of such distribution, marginal respect to the Western Palaearctic but nonetheless related to its ecological processes. These are Afrotropical species which can be found in the Western Palaearctic as a result of their desertic or subdesertic habits, and the consequent ability to survive in extreme environmental conditions. Some of these groups, such as the Tibesti baboons, appear to have become extinct in very recent times. Others – like the baboons in the desert of southern Libya – are documented by limited archaeozoological and iconographical evidence, but cannot be precisely assigned to either a relic or anthropochorous distribution. A similar comment could be made about the current distribution of sacred baboons, in view of their presence in the culture of ancient Egypt. The Aegean "blue monkeys", instead, are undoubtedly associated with human settlement, and we cannot exclude their possible

naturalisation, albeit for a chronologically limited period of the protohistoric era.

The Cape Verde monkey deserves a special mention. Although this species was naturally distributed in Western Africa, it was introduced on Cape Verde possibly in the 17th century, where it underwent complete naturalisation, to the extent of being taxonomically described on the basis of specimens from the island of Santiago.

While the Western Palaearctic has a very limited biological record as regards the distribution of primates, it has nonetheless played a crucial role in human culture. Over millennia of human transit and commerce, a large amount of zoological information has been encapsulated in “humanistic and artistic media”. The painting, sculpture and architecture of Europe and the Mediterranean offers a wealth of information on different aspects of the biodiversity of primates (anthropochorous relocations, historical ranges and much more besides). One of the major problems in this context is that whenever a primate is evoked in literature and/or represented in a work of art or architecture, it tends to be generically identified simply “as a monkey”. The literary, archaeological and artistic interpretations of the iconography demand a multidisciplinary approach that exploits both humanistic and scientific expertise. Here we have attempted to introduce some of these topics, which clearly call for further study in the appropriate disciplinary context.

We feel it is important to emphasise the role of human populations as “biogeographical vectors”. Apart from the aforementioned case study of the Cape Verde monkey, and the possible relationships between the North African cultures and baboons (*Acacus* and ancient Egypt), we have also referred to the remarkable presence of African primates in Neotropical environments. The timing of such processes, and the biological success of certain introductions (i.e., naturalisation) raise questions about the proper use of terms such as “natural” or “artificial”, when dealing with expansions of anthropochorous range. Effectively, this could be regarded as one of the many cases of the joint dispersal of species.

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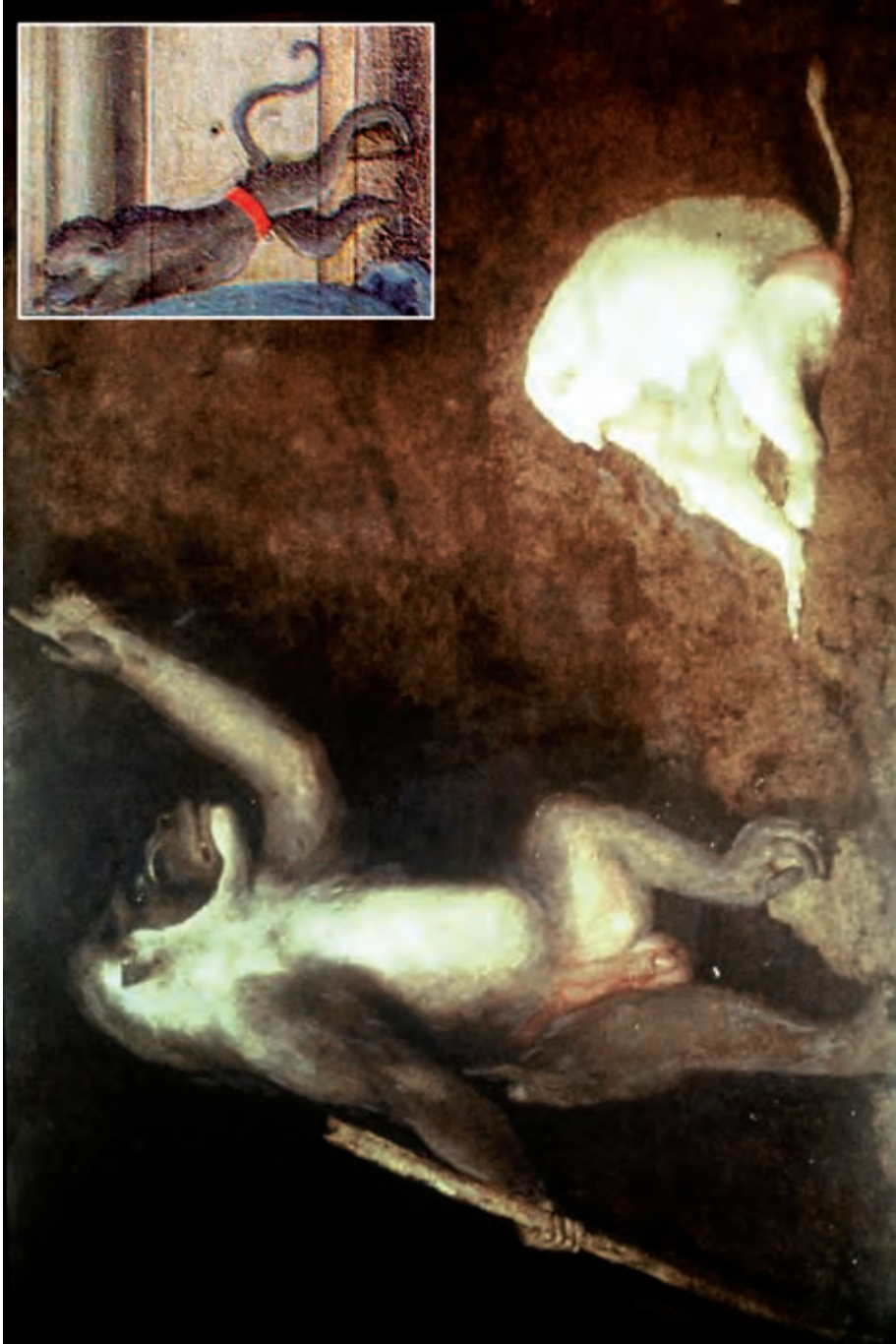


Plate 1 - George Stubbs "Drill and albino hamadryas baboon" (1770-1775). Reproduced by permission of the Royal College of Surgeons of England, London. In the small frame. Detail of one olive baboon portrayed in the background of the "tondo" painting Adoration of the Kings by Sandro Botticelli, dated to about 1470-1475 (London, National Gallery).

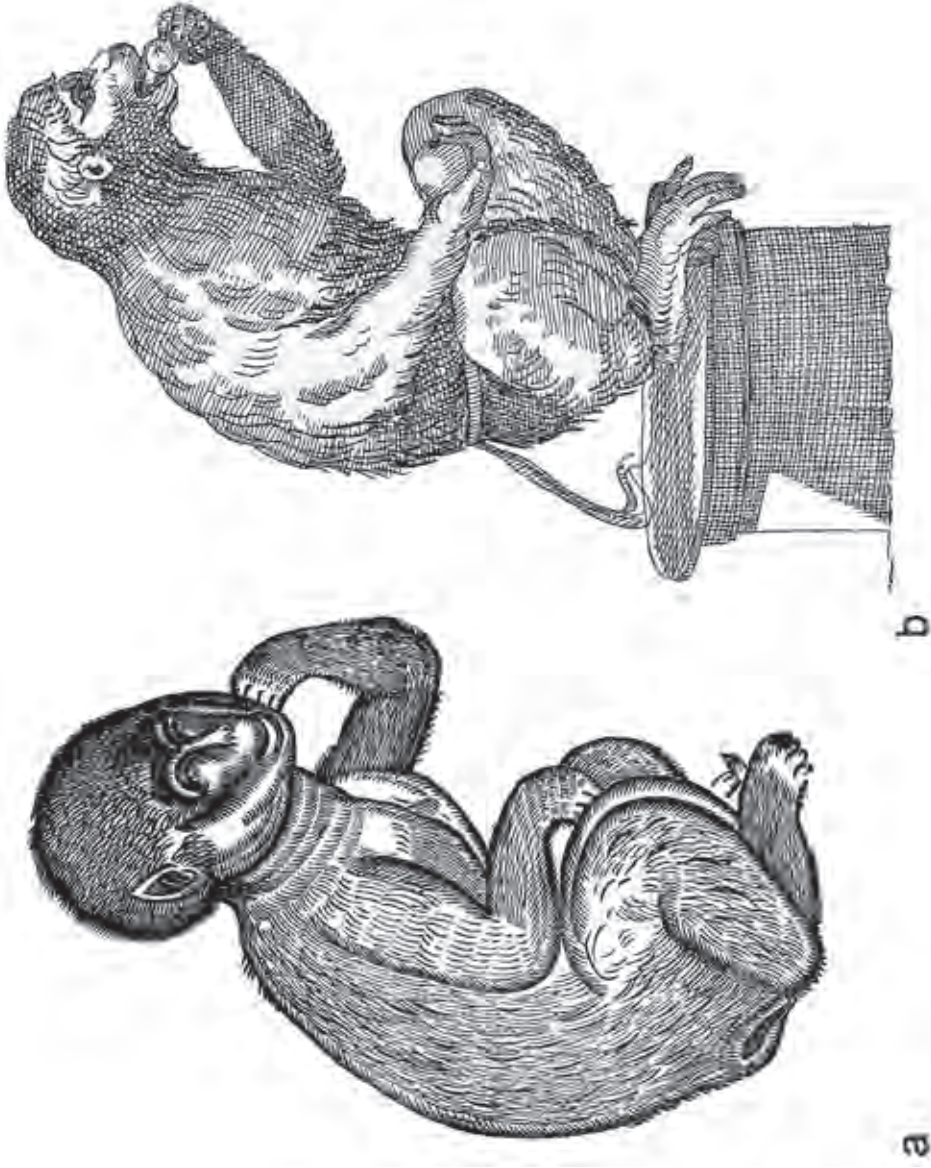


Plate 2 - a) Portrait of a Barbary macaque from the *Historia animalium* by Konrad Gessner (1516-1565). b) Artistic representation of a captive specimen of *M. sylvanus*, published by Prosper Alpin in his *Historia Naturalis Aegypti* (1581-1584).



Plate 3 - Detail of the mosaics of the Great Palace of Istanbul (first half of the 6th century).



Plate 4 - 16th century engraving representing a monkey hunt from Venationes Ferarum, Avium, Piscium by the Flemish artist Jan van der Straedt, also called Antonio Stradano.

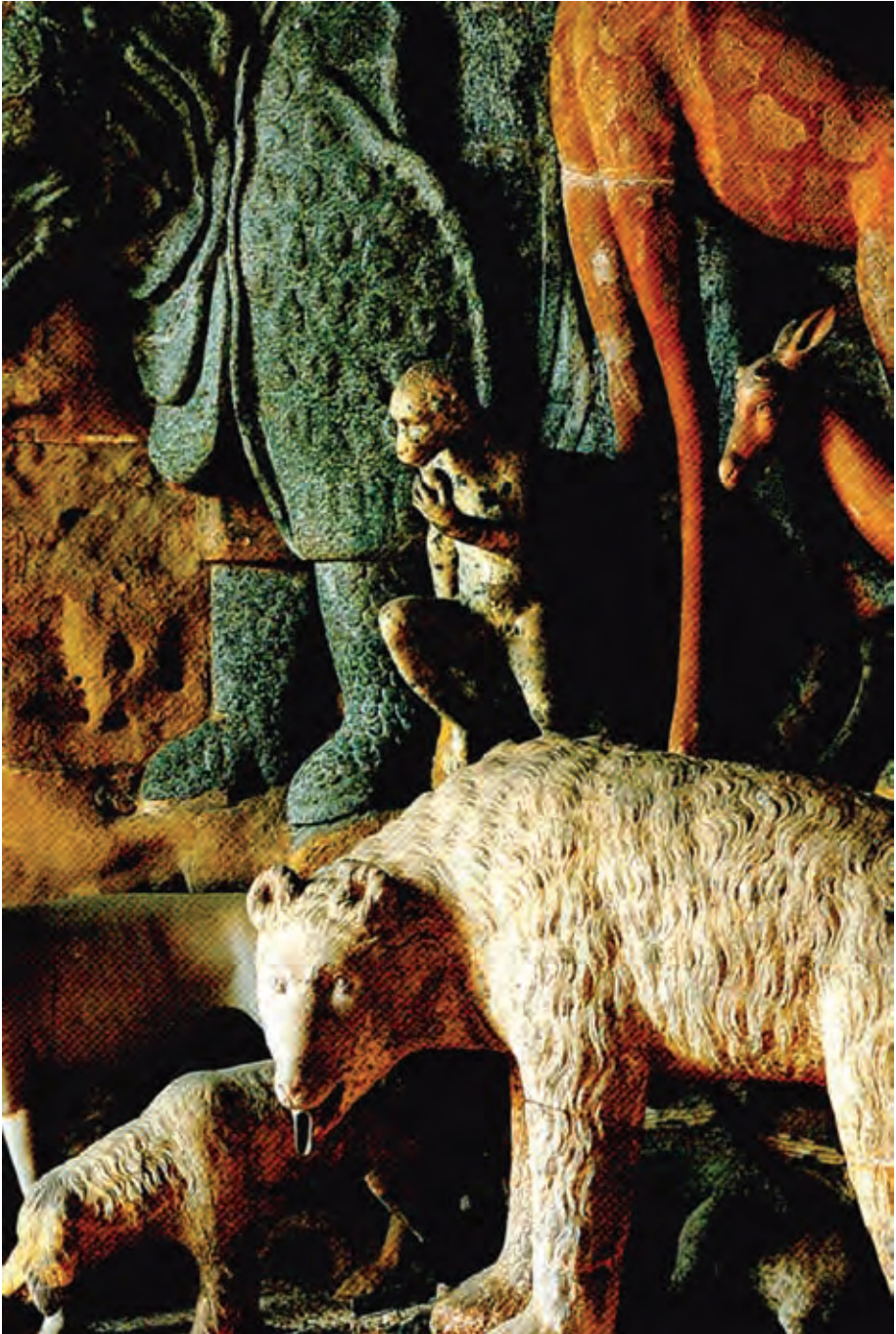


Plate 5 - One of the two images of Barbary macaques realized in polychrome marble by the sculptor Cosimo Fancelli around 1555, in the Grotta degli Animali of the Medici Villa of Castello, near Florence



Plate 6 - Detail of the frescoes painted in the first hall of Buontalenti's Grotta Grandely Bernardino Poccetti between 1586 and 1587. Boboli Gardens, Florence (photo Lorenzo Giotti; courtesy of Soprintendenza per i Beni Architettonici e del Paesaggio e per i Beni Artistici e Storici e Demoetnologici per le Province di Firenze, Pistoia e Prato).



Plate 7 - Detail of the wall-paintings of the tomb of Khnemhotep, at Beni Hasan (Egypt), showing olive baboons on a fig tree (Dynasty XII, 1991-1785 BC).



b



a



c

Plate 8 - Top left: Among the artistic production of the Round Head style, another monkey profile was initially recognised at Ti-n-ascig, but the image is more probably a large carnivore. Top right: at In Farden, Fezzan (Libya) there is an alleged representation of a red monkey hunting, but the image is very stylised, and difficult to assess. This representation has been connected with the artistic context of the so-called Late Pastoral style. Bottom: a group of four baboons represented in a wall drawing at the site of Teshuinat III, possibly dating to the Middle Pastoral (6000-5000 ybp). The mane and sexual characteristics suggest that the first is an adult male, followed by three juveniles or females.



Plate 9 - The hamadryas evoked in the wall-paintings of Tutankhamun's burial chamber, in the Valley of the Kings at Thebes, Egypt (Dynasty XVIII).



Plate 10 - The description of Linnaeus and the Latin name of the species, *Simia sabaea*, (*Systema Naturae*, 12th ed., 1: 38) were based mainly on a single specimen originating from the island of Santiago, which was published by George Edwards in his *Gleanings of Natural history* (1758-1764).



*Plate 11 - Adult individual of *C. sabaeus*, depicted by Andrea del Sarto in the Medici Villa of Poggio a Caiano, near Florence (around the end of the second decade of the 16th century).*



Plate 12 - Detail of the wall-paintings of the 18th Dynasty tomb of of Rekh-mi-Rē, vizier of Thutmosis III and Amenhotep II (from about 1470 to 1445 B.C.), at Thebes (Egypt).



Plate 13 - Detail of the decoration of the tomb Tiy, the queen of Amenhotep III (1391-1353).



Plate 14 - "Blue monkeys" are a recurrent motif in the production of the Aegean Late Bronze Age artists.

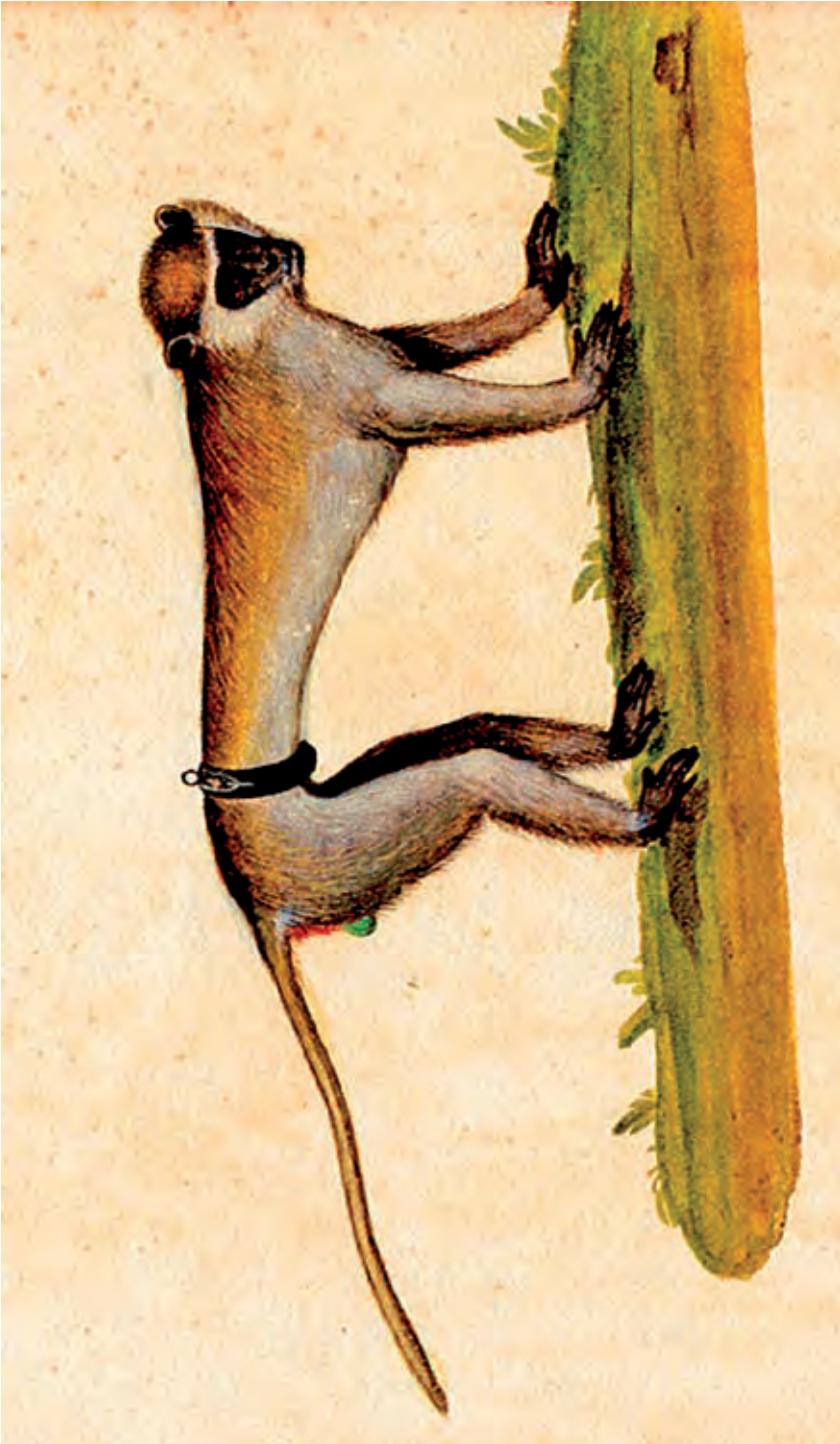


Plate 15. The occurrence of an image of *C. aethiops* in the work of the 16th century Italian naturalist Ulisse Aldrovandi (V, a., c. 21) - still preserved in the Biblioteca Universitaria of Bologna (Italy) - provides evidence of the conspicuous trade contacts that still existed in the **Middle Ages between Italy, Egypt and eastern North Africa.**

