ASSES

by Valerie Porter

Introduction

> 'The ass, in his natural temper, is humble, patient, and quiet, and bears correction with firmness. He is extremely hardy, both with regard to the quantity and quality of his food, contenting himself with the most harsh and disagreeable herbs, which other animals will scarcely touch. In the choice of water he is, however, very nice; drinking only of that which is perfectly clear, and at brooks with which he is acquainted. He is very serviceable to many persons who are not able to buy or keep horses; especially where they live near heaths or commons, the barrenness of which will keep him; being contented with any kind of coarse herbage, such as dry leaves, stalks, thistles, briers, chaff, and any sort of straw. He requires very little looking after, and sustains labour beyond most others. He is seldom or never sick; and endures hunger and thirst longer than most other kinds of animals. The ass may be made use of in husbandry to plough light lands, to carry burdens, to draw in mills, to fetch water, cut chaff, or any other similar purposes. The female is also useful in many cases for her milk, which is excellent; and she might be of more advantage to the farmer if used, as in foreign countries, for the breeding of mules. The skin of the ass is extremely hard, and very elastic, and is used for various purposes; such as to cover drums, make shoes, or parchment. It is of the skin of this animal that the Orientals make the fagri, or, as we call it, shagreen. The milk of the ass is the lightest of all milks, and is recommended by medical men to persons of delicate stomachs; the flesh, and the hair of the tail and mane, are used as those of the horse.'
>
> J.C. Loudon, *An Encyclopaedia of Agriculture* (1825, London)

The domesticated ass, or donkey (a term now widely used in the English language to distinguish the domesticant from the wild species), is sometimes described as the poor man's horse and it is indeed closely related to the domestic horse: both are in the genus *Equus* and have been interbred to create mules. Both are also closely related to zebras, and some people have tried to interbreed zebras with donkeys.

Wild ass

Wild asses, sometimes classifed as a subgenus, *Asinus*, of the genus *Equus*, include the African wild ass (*Equus africanus*), the Asian wild ass (*Equus hemionus*) and the kiang (*Equus kiang*). There are separate entries for each of these species.

The African wild ass includes two extant subspecies: the Nubian (*Equus africanus africanus*) and Somali (*E. a. somaliensis*). The Asiatic wild ass has five subspecies: the Mongolian khulan, the Indian khur, the Turkmenistani kulan, the Iranian onager and the extinct Syrian wild ass.

The European or Eurasian wild ass (*Equus hydruntinus*) has been extinct since perhaps the Iron Age (1200 BC–AD 400). A 17th century specimen from Portugal, purported to have been the last representative of the species, was re-examined but showed a strong relationship to domestic donkeys (Orlando *et al*., 2009; see also Cardosa *et al*., 2013). The distribution of the Eurasian wild ass had ranged from Mediterranean Europe to the Middle East, certainly as far east as Iran and possibly beyond. Genetic data suggests that it was a subspecies of the Asiatic wild ass (*E. hemionus*) but the taxonomy remains to be clarified. It is sometimes described as the Eurasian hemione.

Domestication and spread

The domestic ass, or donkey, is usually described as *Equus asinus* (or less acceptably *Equus asinus asinus* or *E. africanus asinus*). The term 'donkey' has been widely used from the 20th century to differentiate between the domesticant and the wild ass; it is also used, it must be admitted, because of the association of the word 'ass' in American English with coarse expressions.

J.C. Loudon (1825), in his *Encyclopaedia of Agriculture* published in London, stated that the ass 'is a native of the mountainous deserts of Tartary, of Arabia, Persia, and other parts of the Asiatic continent; and at present is very generally domesticated throughout most civilised countries'. However, there does not actually appear to have been any domestication of the Asiatic wild ass or of the kiang, and the diploid number of chromosomes in the Asiatic species is in the range of 51–56, whereas in the African wild asses it is 62–64 and in the donkey it is 62. The donkey is unusual among livestock in that it has evolved from African rather than European or Asian wild species. It was originally domesticated from the African wild ass (*qv*), though there continues to be some debate about whether the ancestor was the Nubian, the larger Somali, or both subspecies, or even an extinct Atlas subspecies (*E. africanus 'atlanticus'*) of the North African coast (mainly Algeria). The sandy-coloured Nubian wild ass tends to carry the typical dorsal stripe and shoulder cross seen on many domestic donkeys, whereas the reddish-grey Somali usually lacks the cross and back stripe but has zebra-like leg stripes (the Nubian's legs are usually plain).

It has been suggested (e.g. Kugler *et al*., 2008) that the donkey was first domesticated in Libya (North Africa). Beja-Pereira and colleagues (e.g. Beja-Pereira *et al*., 2004; Vilá *et al*., 2006; Kimura *et al*., 2010; Kefena *et al*., 2011) have carried out surveys in many countries to try to determine when and where

© V. Porter, G.L.H. Alderson, S.J.G. Hall and D.P. Sponenberg 2016.

domestication first took place and have broadly concluded that, based on mitochondrial DNA (mtDNA) samples, there are two distinct haplogroups of domestic donkey: one clearly derived from the Nubian subspecies (Clade 1) and the other (Clade 2) close to the Somali but not falling within its wild range (the Somali shows considerable mitochondrial divergence from the Nubian and from the domestic donkey) and therefore possibly from a third long-extinct relative of the Somali or, more likely, another Nubian-like type. The Atlas wild ass also remains a candidate for Clade 2: specimens identified as early domestic donkeys or as wild ass have been excavated in the Maghreb and the coast of Yemen, but further genetic research is needed. Overall, Kimura *et al*. (2010) suggested that donkeys were probably domesticated twice, once from each of two different wild subspecies (the main one of which was the Nubian), about 5000 years ago. The question remains as to whether the earliest domestication was in Egypt, as often suggested, or elsewhere in north-east Africa (the Near East has been suggested as another possible area of origin, but evidence from Mesopotamia is later than from Egypt). For example, Kimura *et al*. (2010) showed that the ancient distribution of the Nubian wild ass and of the Clade 1 domesticants was from the Atbara river and Red Sea Hills in Sudan and northern Eritrea across the Sahara westwards to Libya, and suggested that it might have been prehistoric pastoralists who domesticated the Clade 1 group, though it is also possible that domestication was by farmers in the northern Nile Valley.

Marshall and Weissbrod (2011) considered donkey domestication through the eyes of archaeological anthropology. They stressed that donkeys, unlike most other domestic livestock, were not primarily a source of food: they were above all a means of transport, and they were desert animals. With the expansion of the Sahara's desert regions, mobility grew in importance and migrations became more long-distance. It seems to have been in the mid-Holocene period of increasing aridity some 6000 years ago that people in north-east Africa domesticated the donkey. Secondly, the process of phenotypic and morphological changes distinctive of domestication was a slow one in donkeys, possibly misleading earlier researchers about the true history of their domestication. For example, the type of heavily laden donkey used by Egyptian pharaohs for transport some 5000 years ago had remained morphologically wild for a thousand years after the species was first domesticated (Rossel *et al*., 2008): in ancient Egypt the earliest archaeological records of potentially domestic donkeys date back more than 6000 years to 4600–4400 BC. It remains probable that pastoralists on the fringes of the Sahara and in the Horn of Africa were the first to domesticate the wild ass, during the mid-Holocene.

The initial spread of the donkey into Europe may have been from about 2000 BC: there is evidence of domestic donkeys in rock paintings in Spain and Italy from that period. It had previously been thought that it was the Phoenicians who first introduced donkeys into the Iberian peninsula, during the period 900–750 BC, but Cardoso *et al*. (2013), using morphological and mitochondrial genome analyses, were able to demonstrate that an equid tooth from Leceia (a huge fortified agrarian site in Portugal, near Lisbon) was from a domestic donkey, *Equus asinus*. Radiocarbon dating placed the tooth to 2080–2060 BC with 95% probability.

The Romans spread the donkey further across the continent, as far as Germany and Britain, though the animals often disappeared in the more distant regions after the fall of the Roman Empire, persisting mainly in Mediterranean areas. Around 2000 years ago they also made their way eastwards into the Indian subcontinent, China and Malaysia. In the early 19th century asses were apparently unknown, or at least unremarked, in regions such as Tartary (the huge area of northern and central Asia stretching from the Pacific to the Caspian Sea and the Urals), Burma, Laos, northern India, Sri Lanka and Vietnam.

Donkeys were reintroduced into parts of Central Europe by monks in the Middle Ages; and they were taken from the Iberian peninsula across the Atlantic to South and Central America and the Caribbean with early voyagers and settlers in the 16th century.

Breeding

Wild asses tend not to produce their first offspring until they are 4–5 years of age, or even later in times of stress such as prolonged drought. Thereafter they reproduce only in alternate years in the wild, though they have the biological potential to foal annually. They are very careful mothers and this characteristic is also apparent in the domestic donkey.

The male donkey is known as a **jack**; the female is a **jenny** (or jennet). The jenny's oestrous cycle ranges from 23 to 30 days and the average heat period is 6–9 days. The conception rate is slightly higher than in horses and twinning is more frequent than in horses. The gestation period is 360–375 days or more (up to 14 months in some cases).

The donkey is essential to the creation of the mule (*qv*), which is a sterile hybrid between donkeys and horses. A **mule** is a cross between a jack and a female horse (mare). A **hinny** is a cross between a male horse (stallion) and a jenny. The diploid chromosome number for the donkey is 62 and for the horse 64. Attempts have also been made to breed donkeys with zebra (32–46 chromosomes) (*see* Zebra hybrids).

Uses

The donkey has always been valued as a working animal rather than a productive one. In particular it has traditionally and widely been used as a pack or baggage and riding animal, especially in regions with rough or steep ground and often grossly overloaded, and also to pull ploughs on light land, draw urban carts and supply muscle power for pumping water, grinding flour and working on treadmills. Donkeys were sometimes exploited for milk, meat (e.g. China and Persia) and hides for leather, as incidental to their main use as a working animal, and continue to be in demand to sire mules. Mules and donkeys were heavily used by the military in many arenas as a means of transport, especially in difficult terrain, and this persisted quite widely into and beyond World War II (*see* Mule).

In many countries where donkey populations are falling, the animals are hardly describable as 'workers' in the traditional

sense. They have been displaced from their ancient niche of usefulness by mechanization and motorized transport and instead many now serve the leisure and tourist industries or are simply companion animals and pets.

A more recent role for donkeys is as livestock guards. Donkeys have an inherent dislike of dogs and other canids, including coyotes and wolves, and will bray loudly, show their teeth and will chase and attempt to bite and kick such intruders. In Texas, for example, donkeys are used to keep coyotes away from flocks of sheep and goats. In Australia, they are used to protect sheep and even cattle indirectly; the donkeys are not deliberately protecting the livestock but are simply reacting aggressively towards predators that they perceive as a threat to themselves and their adopted herd.

Another new role is in what is variously termed donkey-assisted therapy or 'onotherapy'. The patient nature, reliability, small size, slowness, calmness, empathy and softness to the touch of the donkey are exploited in an alternative therapy for those with intellectual disabilities, Alzheimer's disease, autism, speech impediments, cardiac and hypertension problems, emotional problems, blindness, anxiety disorders, addictions, children with special needs, and other physical and psycho-social challenges. In some cases the therapy involves the patient becoming responsible for the care of the animal rather than simply establishing a good relationship with it.

The ancient tradition of using donkey's milk for human consumption and for cosmetic purposes is now rarely practised. However, in Italy, especially Sicily, there is a nascent revival in the production of donkey milk for a niche market, partly as a way of retaining interest in the country's endangered breeds and in the general tradition of donkey keeping. The milk is promoted as being hypoallergenic and especially suitable for infants or invalids. Some of the milk is used for making soaps and skin creams.

With no donkey dairy breeds, milk yields are much lower than in other livestock. Nor have any breeds been developed for meat production, though in some countries (e.g. Nigeria) there is a rapidly growing market for donkey meat.

Breeds

Despite the donkey's essential working role in many societies, whether in agriculture, commerce or for military purposes, remarkably little breed creation has been pursued over the millennia. In many countries, donkeys are just 'common' donkeys with little to distinguish them from those in neighbouring or even distant lands. The main differences lie in size and to a limited extent in colours and coat markings (especially dorsal and shoulder stripes and leg stripes), but there is much less variation in colour or in conformation than in other livestock species. It was in the regions where mule breeding was practised that attention began to be given to developing donkey breeds, in order to produce large strong sires.

Donkeys did not come to the attention of the 'improvers' of the 18th and 19th centuries whose breeding methods led to the creation of so many identifiable breeds in other livestock, with herd books and breed societies to promote them. In Europe, on the whole, any breed differences developed fairly haphazardly through geographical isolation, environmental factors and different management practices, rather than by the careful selective breeding that has been applied to other livestock. All over the world, donkeys are just donkeys, always there, relied upon heavily by the poorer levels of society, essential but so commonplace that their welfare, let alone their breeding, has been ignored.

Such donkeys breeds as do exist are often rare or close to extinction, even more so in the past half a century in which donkey numbers have fallen sharply in many parts of the world as the patient beast of burden is replaced by the mechanization of agriculture, cheap motorized transport and other forms of power such as electricity. Data on breeds in each country are hard to verify, but it would seem that there are considerably fewer than 200 breeds or definable types worldwide. The 2000 edition of *Mason's Dictionary* listed about 90 breeds and varieties and 30 national or regional types. More have since been noted, or claimed, though only rarely do they have a herd book, breed society or other formal recognition. The current DAD-IS database lists 188 'breeds', but many of these are simply local names for the same general type.

There has been invaluable work in recent years to identify and characterize donkey populations that might be termed breeds, sometimes by individual countries but also especially in Europe through the SAVE (Safeguard for Agricultural Varieties in Europe) Foundation and its Monitoring Institute for Rare Breeds and Seeds in Europe based at St Gallen, Switzerland; and in Africa through ATNESA (Animal Traction Network for Eastern and Southern Africa, closely linked with many other regional and national animal traction networks). Both organizations run international workshops and conferences and produce invaluable publications. Other useful organizations for European donkeys include the AgroBiodiversity Network and ELBARN (European Livestock Breeds Ark and Rescue Net). Internationally the most useful starting point for donkey breeds is DAD-IS, the FAO's Domestic Animal Diversity Information System.

Names for ass in various languages that might form part of a breed name include (with various spellings and phonetical interpretations): ainu, âne, asino, asnal, asno, asto, ayul, baudet, bourricot, buriki, burro, buruwa, dameer, dhongi, donkey, esek, Esel, gomari, harre, hmar, jaki, jumento, kaldai, keledai, ker, kuur, măgar, magarac, merkep, moke, mbongolo, molenti, mpunda, onos, osel, osikiria, osioł, osol, poleddu, pünda, ruc, sumèr, szamár, ulaq, wuhlo, zag and many more.

Populations

According to FAO statistics for 2013 (faostat.fao.org) (*see* Table 1), there were about 43.5 million donkeys and 10 million mules worldwide but the population is probably substantially higher, as many are not registered in any way. The FAO statistics give the highest donkey populations as being in Ethiopia (7 million), mainland China (6.4 million), Pakistan (4.9 million), Egypt (3.356 million) and Mexico (3.28 million), followed by more than 1 million each in Iran, Afghanistan, Nigeria, Niger and Burkina Faso, and more than 900,000 each in Morocco, Mali and Brazil. The highest mule populations in 2012 were in Mexico

Table 1. Ass and mule population trends by country (excluding those with fewer than 500), comparing 2013 and 1961 (source: FAOSTAT, FAO Statistics Division)

Country	2013 Ass	2013 Mule	1961 Ass	1961 Mule
Afghanistan	1,451,000	21,000	1,300,000	20,000
Albania	55,000	8,000	57,100	17,000
Algeria	136,000	33,500	315,000	175,000
Angola	4,500		3,100	
Antigua & Barbados	1,700		2,300	
Argentina	98,000	185,000	129,000	328,000
Armenia[1]	6,000	300		
Australia	2,000		5,000	
Azerbaijan[1]	43,425	88		
Barbados	2,300	2,000	2,000	2,000
Belarus[1]	9,000			
Benin	620		737	
Bhutan	18,000	5,300	12,000	4,300
Bolivia	635,000	82,000	445,000	56,000
Botswana	341,000	3,200	26,533	612
Brazil	915,000	1,239,000	1,044,000	1,388,000
Bulgaria	35,000	3,000	256,677	32,520
Burkina Faso	1,100,000		140,000	
Cabo Verde	15,300	1,860	4,846	1,029
Cameroon	40,000		39,000	
Chad	480,000		400,000	
Chile	15,650	7,000	15,000	29,000
China (mainland)	6,361,000	2,492,000	7,527,000	1,427,000
Colombia	63,333	150,702	294,000	342,000
Comoros	5,400		3,000	
Costa Rica	8,100	5,260	3,600	7,100
Croatia[2]	3,000			
Cuba	14,400	20,600	5,000	30,000
Cyprus	5,200	1,500	44,500	3,800
Djibouti	8,400		3,000	
Dominican Republic	150,500	142,000	142,000	85,000
Ecuador	118,462	107,674	150,000	86,000
Egypt	3,356,000	1,165	1,526,624	8,544
El Salvador	3,250	24,100	2,000	31,000
Ethiopia	7,000,000	345,000	3,700,000	1,300,000
France	15,000	30,968	76,200	67,300
Gambia	60,000		3,000	
Georgia[1]	10,000	100		
Ghana	14,350		12,300	
Greece	43,000	22,000	506,525	222,258
Grenada	660	50	1,800	100
Guadeloupe	200	150	1,100	600
Guatemala	10,000	39,000	6,902	54,005
Guinea	2,200		2,150	
Guinea-Bissau	5,200		2,558	
Guyana	1,020	160	8,000	2,000
Haiti	210,000	80,000	130,000	58,700
Honduras	23,150	70,000	32,000	95,000
Hungary	4,000	200	3,178	1,264
India	292,000	104,000	1,096,259	52,813
Iran	1,600,000	175,000	2,034,000	231,000
Iraq	380,000	11,500	55,000	104,000
Ireland	6,100	1,200	89,330	2,981

Continued

Table 1. Continued.

Country	2013 Ass	2013 Mule	1961 Ass	1961 Mule
Israel	5,000	1,600	21,500	7,000
Italy	24,000	9,000	499,000	334,100
Jamaica	23,000	10,000	38,800	12,400
Jordan	9,000	1,200	56,001	9,297
Kazakhstan[1]	30,000			
Kyrgyzstan[1]	77,210	500		
Lebanon	15,000	5,000	19,400	5,800
Lesotho	130,000	2,500	53,013	4,316
Libya	29,000		102,000	960
Madagascar	150		253	
Malawi	6,311		430	
Mali	939,835		294,000	
Malta	480	300	2,388	1,599
Mauritania	170,000		130,000	
Mauritius	60	20	50	25
Mexico	3,280,000	3,285,000	2,890,539	1,549,112
Moldova[1]	2,400			
Montserrat	400		1,000	
Morocco	944,360	453,330	1,007,000220,000	
Mozambique	48,300		12,166	
Namibia	140,000	6,700	57,375	2,708
Nicaragua	9,000	48,000	6,500	40,000
Niger	1,168,000		301,000	
Nigeria	1,265,000		1,398,000	
Oman	24,000		20,000	
Pakistan	4,900,000	200,000	950,000	25,749
Paraguay	35,000	10,700	21,450	7,976
Peru	640,000	307,000	435,000	193,000
Portugal	120,000	40,000	201,000	112,000
Puerto Rico	2,000	2,600	1,900	3,100
Réunion	10	5	400	600
Romania	30,000		27,000	
Russian Federation[1]	14,636	224		
St Lucia	600	1,100	500	1,000
St Vincent and Grenadines	1,300		2,000	
Samoa	7,000		6,000	
Saudi Arabia	100,000		55,000	
Senegal	459,000		65,000	
Somalia	22,000	22,000	28,000	19,000
South Africa	155,500	15,000	345,000	50,000
Spain	142,000	110,000	685,591	1,158,033
Sudan (former)	752,000	637	578,000	500
Switzerland	16,000	800	380	950
Syrian Arab Republic	98,600	2,798	186,243	72,331
Tajikistan[1]	175,000			
Tanzania	182,000		143,000	
Togo	3,400		1,632	
Trinidad and Tobago	2,300	2,000	2,000	2,500
Tunisia	240,200	82,200	180,000	52,000
Turkey	188,789	47,205	1,891,800	170,200
Turkmenistan[1]	25,000			
Uganda	19,200		18,000	
Ukraine[1]	12,000			
Uruguay	1,600	4,000	1,500	3,500

Continued

Table 1. Continued.

Country	2013 Ass	2013 Mule	1961 Ass	1961 Mule
USA	52,000		15,000	
USSR (former)[1]			804,000	4,300
Uzbekistan[1]	290,000			
Venezuela	440,000	72,000	410,000	78,000
Western Sahara	510		877	
Yemen	718,000		600,000	
Yugoslav SFR (former)[3]			140,000	32,000
Zambia	2,100		1,000	
Zimbabwe	112,000	1,225	67,000	1,030
WORLD TOTALS	**43,503,728**	**10,172,586**	**36,958,302**	**10,476,736**

[1]Part of the former Soviet Union (USSR), dissolved 1991 and formerly including Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Russia, Tajikistan, Turkmenistan, Ukraine, Uzbekistan
[2]Part of Yugoslav SFR until 1991
[3]Formerly (1944–1992) included Bosnia & Herzegovina, Croatia, Macedonia, Montenegro, Serbia, Slovenia. Montenegro and Serbia together were known as the Federal Republic of Yugoslavia (1992–2006)

(3.285 million), China (2.49 million), Brazil (1.24 million), Morocco (453,000), Peru (307,000) and Pakistan (200,000).

These figures can be compared with FAO statistics for 1961, when the total number of donkeys worldwide was nearly 37 million and of mules nearly 10.5 million (*see* Table 1). Perhaps surprisingly, therefore, the world total of donkeys has increased over the past half a century, though mule numbers are similar. In 1961 the highest donkey populations were in mainland China (7.5 million), Ethiopia (3.7 million), Mexico (2.9 million), Iran (2 million), Turkey (1.9 million), Egypt (1.5 million), Nigeria (1.4 million), Afghanistan (1.3 million), India (1.1 million), Brazil (1 million) and Morocco (1 million). The highest mule populations were in Mexico (1.55 million), China (1.43 million), Brazil (1.39 million), Ethiopia (1.3 million) and Spain (1.2 million).

The trends differ in various regions. The most dramatic increases are seen in African countries (Botswana, Egypt, Ethiopia, Lesotho, Mali, Mozambique, Namibia, Niger, Senegal, Tunisia), the Indian subcontinent and Latin America (Haiti, Mexico and Peru). The biggest decreases are seen in European countries (Bulgaria, Cyprus, Greece, Ireland, Italy, Malta, Portugal, Spain, Turkey).

Population figures in breed entries are mainly based on FAO statistics, though these are not necessarily reliable and sometimes conflict with government census returns in individual countries. In many countries, donkeys are not considered to be worth counting, or are almost impossible to count where a large number of people each own only one or two donkeys.

Breed descriptions

The most common main **coat colour** in the donkey is grey-dun but the range runs from white through shades of grey to brown, bay and black. There has not been a great deal of selection for more fancy colours but a few animals are red roan or grey roan, or spotted or frosted with white, and some are pied black-and-white or brown-and-white (*see* American Spotted). In the past, all-white donkeys were sometimes regarded as so special that they were only owned by royalty and the aristocracy. The subject of donkey colour genetics has been covered by Sponenberg (2004).

Regardless of the main coat colour (except white), most breeds have **light points**; i.e. the muzzle, the rings around the eyes, the underside and inner thighs are pale to white. To avoid constant repetition, light points should be assumed in the breed descriptions below, but exceptions are noted. The pale or 'mealy' muzzle and eye rings are sometimes bordered with a tan colour. In Italy, the imaginative phrase sometimes used to describe the pale underside might be *con ventre di biscia o di cervo* (literally, snake belly or deer belly).

Most donkeys have the Nubian wild ass's **dorsal stripe** (also known as eelstripe, or *riga mulina* in Italian) of dark to black hairs along the length of the back, often extending from the mane to the tail tassel, though this may not be apparent in very dark coats and may be thin, curtailed or broken in some animals. In addition, many have a dark **shoulder stripe** (*croce scapulare*), running laterally over the top of the withers and passing over the dorsal stripe to form the typical ass's **cross** known as *riga mulina crociata* in Italy, or *croix de St André* in France. Some have a **ventral line** of hairs of a different colour running centrally along the length of the underside; some might have horizontal 'zebra' **leg stripes**, bars or 'garters' similar to those seen in the Somali wild ass. Many have dark edges or fringes on the ears. A few have 'collar buttons', or small dark spots, on the throat.

The **size** of a donkey depends partly on type but also on its environment, diet and management. Measured at the withers, the smallest or miniature breeds are less than 90 cm and the largest, such as the Poitou, might be as tall as 150 cm. Mules can be even larger. Most donkeys are in the range 96–112 cm in height and these measurements are given for some of the entries below, though in most cases such measurements are unrecorded or unreliable. In the literature, heights are often given in **hands** (hh), where 1 hand (1 h) = 4 inches (10.2 cm), originally taken as the span of a human hand. Thus 10 hh = 40 in or 102 cm. A hands measurement given as '10.1 hh' is not a decimal figure;

it means 10 hands 1 inch, i.e. 41 in or 104 cm; likewise 10.2 hh means 10 hands 2 in (42 in or 107 cm), and 10.3 hh means 10 hands 3 in (43 in or 109 cm). There is no such measurement as 10.4 hh, because of course this would be 11 hands. Conversions from hands to metric measurements have been rounded in the breed entries. Weights are rarely given in the breed entries, as environmental and management conditions are so variable and they are anyway less likely to be measured. Heights are given in breed entries as, for example, '123/119 cm' representing adult male and female, respectively, and a similar system is used for weights.

Occasionally the literature includes **morphometrics** based on body index and similar classifications. Typical measurements include height at various points along the body, especially withers, centre of back, rump, and tail root; body length; thoracic perimeter; head and face lengths, widths and depths, and ear length; leg length, and perimeters at various points on the legs The complex relationship between various measurements (length, breadth, diameter, weight and so on) and between the various indices will lead to descriptions of type. On the whole these terms are not used in the breed entries, but the following definitions might be helpful. A *longilinear* type might be long in the body with a narrow chest; a *brevilinear* type might have a heavy physique with a broad chest; and a *mesolinear* type would be between the two (terms such as 'rectangular' and 'square' are also sometimes used to describe body shape). The metacarpothoracic index indicates the relationship between the animal's mass and the legs that support it and defines three types: *hypermetric* (heavy), *elipometric* (light) and *eumetric* (average). The cephalic index (head width × head length) indicates the proportions of the head, including *brachycephalic* (with a short broad head), *dolichocephalic* (with a long narrow head), or *mesocephalic* (for a head of moderate length and breadth). The work aptitude might be judged by relating the thoracic perimeter with the withers height, and so on.

Ass Breeds

Abkhasian *see* Caucasian
Abyssinian *see* Ethiopian
Achdari *see* Asiatic wild ass; Syrian wild ass
Adriatic *see* Croatian
Afar *see* Ethiopian

African wild ass (*Eritrea, Ethiopia and Somalia*)
The African wild ass (*Equus africanus*) is the ancestor of the domestic donkey and is listed by IUCN as critically endangered. There are fewer than 1000 individuals, and possibly considerably less, remaining in the wild: it is the world's most endangered equid (Moehlman, 2005). Threats to the highly perilous future of the African wild ass include being hunted for food and for medicinal purposes, competing with domestic livestock for drinking water and forage, and interbreeding with domestic donkeys. The distribution area is mainly the arid and semi-arid bushland and grassland on the borders of Eritrea, Ethiopia and Somalia, though there might be a few in Sudan, Djibouti and Egypt. There are two recognized subspecies or clinal variations, the Nubian and the Somali, and perhaps a third unnamed and unconfirmed type in the Sahara (Marshall and Weissbrod, 2011). Studies of faecal samples from wild ass in Eritrea and Ethiopia identified five mitochondrial DNA haplotypes, one of which was specific to the Eritrean population, one specific to the Ethiopian population and the other three shared (Oakenfull *et al*., 2002). The DNA profiles of the Nubian and the Somali form two distinct clusters.

Like other wild equids in challenging environments, African wild ass females tend to delay the production of their first offspring – in this case until 5–6 years of age, or even later during periods of prolonged drought – and thereafter reproduce only in alternate years, largely because of the difficulties in finding adequate drinking water and food (Moehlman, 2005). This low level of reproduction further endangers the future of the wild species.

In general, the African wild ass has a short smooth coat of light grey to sandy, fading to pale or white on the undersides and legs, with a dark dorsal stripe, an upright mane of stiff black-tipped hairs and a black brush at the tip of the tail. It is agile and sure-footed in its naturally rocky environment and can reach speeds of up to 50 km/h. It is a grazing animal, but will also browse.

It is likely that the domestic donkey is mainly descended from the **Nubian wild ass**, *Equus africanus africanus* (Marshall and Weissbrod, 2011). The distribution of the Nubian, which may already be extinct in the wild, is or was on the borders of Ethiopia, Sudan and Eritrea, mainly in the Nubian desert (north-east Sudan) from the Nile to the shores of the Red Sea, and southwards to the Atbara river and northern Eritrea. It is possible that the original distribution of the Nubian in ancient times extended across the Sahara to Libya (Kimura *et al*., 2010).

The Nubian has long ears (in contrast to the Somali) and high narrow hoofs and its height at the withers is in the range of 110–122 cm; the legs are shorter and the body longer than in the Somali. There is always a dark dorsal stripe, which is almost always complete from the mane to the tuft of the tail. If leg stripes are present, they are restricted to a few bands on the fetlocks. Two slightly different regional types have been identified: one in the Atbara region of Sudan and the other in the Red Sea area. The Atbara type never has leg stripes; it has a thick cross-shoulder stripe and its coat is buff or sandy, whereas the Red Sea type has a greyer coat and the shoulder stripe is either thin or absent. In both types the underparts and legs are pale; the mane, dorsal stripe, shoulder stripe and tail tuft are dark.

The **Somali wild ass**, *Equus africanus somaliensis*, has shorter ears than the Nubian, its hoofs are wider and lower, and its height at the withers is in the range of 120–125 cm. The coat is reddish grey, with a dark mane; the dorsal stripe is often absent, or otherwise incomplete, and the shoulder cross-stripe is poorly defined, but dark horizontal leg stripes are present and it is possible to identify individual animals from the unique pattern of their leg stripes. Its distribution is or was in central and southern Eritrea (especially what used to be Denkalia province, now part of the Southern Red Sea region), the Danakil Desert and Awash River Valley in north-eastern Ethiopia's Afar region, the Ogaden region of eastern Ethiopia, northern Somalia (from Maysh and Erigano in Sanaag region in the north, through the Nugaal valley and southwards down to the Shebele river) and western Djibouti. The animals are found at their highest density in

Eritrea's volcanic landscape between the Buri Peninsula and the Dalool Depression, an area designated by the government in the mid-1990s as a high priority area for conservation protection of the African wild ass and as a nature reserve, and their behaviour has been quite closely observed on the Messir Plateau.

The population of the Somali wild ass has fallen by more than 90% since the 1980s. There is a Somali wild ass research project in Eritrea that aims to develop a management plan for the Denkelia region in cooperation with the ministry for agriculture's wildlife protection unit and, importantly, in liaison with the local community: it is seen as essential that the local Afar people, who traditionally share their resources and lands with wildlife, become involved in the protection of wild asses. It is also intended to define a core zone within the biodiversity conservation area of the Buri Peninsula to ensure that the Somali wild ass can continue to reproduce on the Messir Plateau without the risk of interbreeding with domestic asses; and to progress a cross-border programme between Eritrea and Ethiopia, because genetic research has shown that the wild asses in both countries belong to one population.

The driving force for the project to save the Somali wild ass in Eritrea is Dr Patricia Moehlman (chairperson of the Equid Specialist Group, IUCN/SSC), who is also exploring northern Eritrea to determine whether the Nubian wild ass still exists. Part of the project is to conduct research into the current levels of genetic variation in the Messir Plateau and Yob populations of the Somali wild ass in Eritrea; to determine the validity of the subspecific designation between the Somali and Nubian wild asses; and to determine whether hybridization has occurred between wild asses and domestic donkeys (Moehlman, 2002; Moehlman, 2005; Moehlman *et al*., in press).

Al-Barmaki *see* Jordanian

Albanian (*Albania*)
The Albanian word for the local donkey is *gomari*. Donkeys have a long history in Albania, especially in coastal and hilly areas, and are believed to have migrated into the country originally along the Adriatic coast centuries ago with the development of trade connections between Persia, Egypt and Greece as well as with conquering races from Asia Minor. They evolved locally more by natural selection in harsh conditions than by human selection and they continue to be useful and common in rural areas, despite agricultural intensification and the depopulation of remote regions. In 2013 the population was estimated at 55,000, mainly in the lowlands and hills, where they are preferred to horses and mules, though mules (8000 in 2013) are more useful in the mountains (Papa and Kume, 2012). Donkeys, being relatively small, are seen as cheaper to feed as well as being strong, resistant and well suited to work on small family farms. The population is certainly declining but the number of horses and mules has fallen at a faster rate than that of donkeys since the early 1990s, and at the same time there has been a notable increase in the preference for male donkeys over females, as they are perceived to be stronger workers. Small family farmers have turned increasingly to using more animals on the farm because of difficulties with high prices for mechanical work, and they tend to keep just one donkey per farm, preferably aged 2–7 years old to take advantage of the younger animals' vitality and ability to perform a lot of work. Donkeys are not kept to produce meat or milk but typically as pack animals or for other farm work (66%), or to pull carts.

The coat is usually grey, black, reddish or 'purple'. Because of conditions in Albania the donkeys are small, averaging 107 cm at the withers (range 102–120 cm) but there appear to be two morpho-biometric types: a miniature one in the uplands (average height 98 cm, body length 104.2 cm, bodyweight 97.3 kg, and smallest in the mountains) and a standard size in the lowlands (115 cm, 131.6 cm and 154.7 kg, respectively) (Papa and Kume, 2012). Very active steps have been taken in Albania to catalogue its livestock breeds (updated annually) and to ensure that no breed becomes extinct. The Albanian National Association for Conservation and Development of Animal Genetic Resources (ALBAGENE) was set up in 2001/2 but donkeys have not been a priority in its activities, though there has been considerable work on cattle, goats, sheep and pigs.

Albino *see* Asinara
Algerian *see* North African
Al-Salibi *see* Jordanian

American (*USA*)
The American Donkey and Mule Society (ADMS, established in 1967) classifies America's donkeys by type or height rather than 'breed' and includes: **Miniature Mediterranean** (< 36 in); **Standard** (36–48 in), subdivided into Small Standard (36–40 in) and Large Standard (48–56/54 in); and **Mammoth** (56/54 in upwards). It also includes American Spotted Ass (*qv*, a trademark term for donkeys registered with the American Council of Spotted Asses, ACOSA), incorporates a Miniature (*qv*) donkey register established in 1958 and has a zebra hybrid/bloodstock register, set up in 1997.

The American Livestock Breeds Conservancy recognizes three ass breeds as in need of conservation in the USA: the Poitou (critical), the American Mammoth Jackstock (threatened) and the Miniature (recovering). The most influential donkey breed in the USA is the American Mammoth Jackstock (*qv*), used in breeding mules. However, FAO statistics for the USA for 2013 show the estimated number of mules in the country as zero (which is very misleading) and the number of donkeys as 52,000. This compares with 15,000 donkeys and 20,000 mules in 1961. Canada's FAO return for 2013 gives no donkeys but 4000 mules, which is exactly the same as for 1961.

The history of the donkey and mule in North America is a relatively recent one, dating back no more than three centuries or so, and is told in the entries for the American Mammoth Jackstock and the American 'wild' burro (which is feral rather than wild). The term *burro*, taken from the Spanish, implies a common working donkey in Spain and Mexico and is often used informally instead of donkey or ass to the west of the Mississippi, whereas donkey is more common to the east. Burro is not used in the context of the Mammoth Jackstock or the Miniature. The term Spanish donkey or Spanish jack is used loosely to mean a large standard donkey but such use is not appropriate unless the animal or its immediate ancestors can be shown to have been imported direct from Spain. Most American donkeys are descended from a mixture of various Spanish breeds.

The ADMS gives a helpful glossary of donkey terms used in the USA. The terms *jack* (for male donkey) and *jennet* (female, rather than jenny) are widely used in North America; the terms *stallion* (male) and *mare* (female) are reserved for horses and zebras. A *mule jack* is a male donkey bred with horse mares to produce mules; a *jennet jack* is a male donkey bred with jennets to produce donkeys. *Jackstock* is the plural for the American Mammoth jack and jennet, and it should also be noted that there is an American preference for calling the Mammoth an ass rather than a donkey. *Horse mule* is the proper term for a male mule (informally known as a *john mule*) and *mare mule* for a female mule (informally a *molly mule*). Young mules less than 3 years old are referred to as *mule colts* and *mule fillies*.

Terms for coat markings include the *cross*, indicating the presence of a dark dorsal stripe crossed at the withers by a dark shoulder stripe (it should be noted that the American Mammoth has been bred away from the cross; it should also be noted that the term *Jerusalem donkey* is merely a nickname for any donkey with a cross, rather than being a breed). A dark line along the underside is a *ventral stripe*. Zebra leg markings are described as *garters* if they encircle the leg, or as *zippers* down the inside of the forelegs. Small black spots on the side of the throat are known as *collar buttons*. There has been considerable American interest in breeding donkeys for interesting coat colours and patterns (*see* American Spotted).

American Mammoth Jackstock (*USA*)
The name of this breed describes it well: it was developed in America as the largest possible donkey to produce stocks of jacks for breeding the best possible draught mules for farmers in the southern and mid-west states. Synonyms include *American Jack*, *Jack Stock* or *Mammoth Jack*, and in Latin America it might be referred to as the *Kentucky*.

It was created over a long period from crossbreeding large imported European donkeys – mainly from Spain and mainly including five different types each with their own special qualities: the heavy-boned dappled Andalusian, the finer and lighter glossy black Catalonian and the huge 'sluggish' heavy-headed black Majorcan, along with the smaller and vigorous black Maltese and to a lesser extent the exceptionally shaggy and heavy-boned French Poitou. In the late 19th century, at the height of the demand for mules, Italian jacks were also imported in fair numbers, partly because they were cheap; they were usually black (sometimes grey) and quite small (13–14 hands; 1 hand = 4 in, or about 10 cm), sometimes vicious by nature and always vigorous, and they were said to be related to the Maltese.

In the very early days, well before the American Revolution of 1765–1783, all sorts of imported Spanish and Portuguese donkeys had been used for American mule breeding, regardless of size or quality, and largely to provide mules for the West Indies. It all became more organized from 1785 when George Washington, at the time a general and a gentleman farmer in Virginia but not yet a president, was given a jack (probably Andalusian) and two jennies by the King of Spain. The jack was dubbed 'Royal Gift' and had been given as a gesture of friendship at a time when Spanish laws prevented the export of their large jacks. Washington was an innovative farmer and was among several who had already decided that mules would be useful to his young nation. Donkeys, let alone mules, had not been taken seriously by English colonists, but Spanish colonists had brought their own donkeys to the south-west and Mexico and it also happened that a few Maltese jacks had been imported into New England a decade or so earlier. The Maltese animals were black or dark brown, quite slender but with good bone, and stood no higher than 14.2 hands (58 in, 147 cm). They were employed in New England to breed mules for export to sugar and cotton plantations in the south and in the West Indies, but their temperament was fiery and it was prohibitively expensive to maintain the Mediterranean breeding stock during harsh New England winters. In Virginia, the climate was more favourable for donkeys, but Washington's large and rather clumsy grey 'Royal Gift', standing at nearly 16 hands (64 in, 163 cm) and with large legs, large head, convex facial profile and large ears, initially failed in his duty as a mule-producing stud. Washington's friend, the Marques de Lafayette, sent two jennies and two more jacks to Virginia and the following year King Charles of Spain sent over another jack as well to add to Washington's stud at Mount Vernon. One of the Lafayette jacks was 'Knight of Malta', which was bred to one of the stud's Spanish jennies and produced what became Washington's favourite jack, 'Compound', which combined the extra size of the Spanish with the good qualities of the Maltese. 'Compound' and 'Knight of Malta' would sire many good mules, including some from the farm's best coach mares. Washington quickly persuaded various friends to take mules seriously.

In Kentucky, statesman Henry Clay also bred mules. He had imported Maltese and Spanish or Andalusian stock and in 1819 he imported a jack named 'Mammoth' (or 'Imported Mammoth'), which was more than 16 hands (163 cm) high, of extreme length, as heavy as a horse, with large heavy bone, great style and good action. It was this prolific and successful jack that gave his name to what became American Mammoth Jackstock, a stud book which was first established in 1888 by the American Breeders Association of Jacks and Jennets. Many jackstocks can trace their ancestry back to Clay's impressive jack, whose breeding career lasted for 9 years.

A second jackstock registry was created in 1908 as the Standard Jack and Jennet Registry of America, or SJJR. The two would merge in 1923 under the latter name. The term 'Standard' in the SJJR name referred to a standardized breed (animals with the particular characteristics that comprised a breed standard) but confusion was caused when the same term was used by the American Donkey and Mule Society (ADMS, formed in 1967) to define a particular size range in its own registry. Therefore the SJJR changed its name in 1988 to the American Mammoth Jackstock Registry (AMJR).

Between 1830 and 1890 large numbers of assorted European donkeys were imported, including Majorcan, Poitou and Italian breeds as well as Catalonian and Andalusian. This diversity was important in the formation of the American Mammoth Jackstock, which still includes different types of jack for breeding different types of mule, exhibiting characteristics from one or other or even several of the ancestral breeds. This is despite the original aims of the 1888 registry, which sought to include only black animals and set a minimum height of 15 hands (152 cm).

The mule became essential to American agriculture and transportation, especially in the plantations of the south but

also on family farms elsewhere. In addition mules worked in mines, pulled barges and streetcars, drew wagons across the prairies and played their part in times of war. Mule breeding became highly profitable in several states and by the 1920s there were about 5 million mules in America – half the world's population.

Mammoth Jacks were crossed with different mare breeds to create mules with different roles: pack, draught, farm, sugar, cotton and mining mules, for example. The jacks were 14–16 hands (142–163 cm) or more in height and 1100–1300 lb (500–590 kg) in weight and they passed size on to their mule offspring as well as the typical jack ears and head. In 1919 the SJJR standards specified a minimum height of 14.2 hands (147 cm), minimum girth 63 in and minimum measurement around the front cannon 7.5 in. Jennies were only a little smaller, and jacks used for siring draught mules were often much larger.

In the 20th century, as in so many other countries, the increasing using of railroads, motorized transport and agricultural mechanization made a massive detrimental impact on the use of mules in America. Some continued to work on farms after World War II but between 1941 and 1971 only 3000 American Mammoth donkeys (jacks and jennies) were registered and the numbers continued to plummet during the 1970s. In the 1980s a slight revival began to rebuild the stock. In 1990 there were about 550 registered animals in the USA (the unregistered population is unknown) and perhaps 50–60 in Canada; globally it was estimated that there might be 3000–4000 animals.

The states of Kentucky, Missouri and Tennessee are at the heart of Mammoth Jackstock breeding in the 21st century. The jacks sire mules for agricultural work where hilly land is dangerous for machinery; mules are also worked by the Amish and other groups that use draught horses; and there is growing interest in using pack mules for tourists and hunters in the mountains and wilderness of the western states. Some are also used as saddle mules. Jackstock frozen semen has been exported to many parts of the world, including China and Latin America.

The standards in what is now the American Mammoth Jackstock Register include height, breadth, depth, length and bone circumference along with other proportions and requirements such as a well muscled neck, good-size feet, well shaped head and strong loin. The minimum height for registration is 14.2/14 hands (58/56 in, 147/142 cm) but the 'model' jack would be no less than 15 hands (60 in, 152 cm) tall. He should have good width, depth and length of body, a strong loin and full hip. The neck should be well muscled but not excessively thick, and of proportionate length. The topline should be straight, the croup well muscled, the shoulders well sloped, the chest broad and the ribs well sprung. The feet should be large and well cupped. Bone should be of good size, flat and clean. The legs are one of the most important features of the Mammoth Jack and must be massive and well formed; they should not be fine in appearance. The head should be well shaped and not of extreme length or thickness, tapering to a relatively fine rounded muzzle, and in good proportion to the body, with large wide-set eyes and well placed long thin upright ears. The profile should be straight or with a slight Roman nose.

There are no colour standards, but black or sorrel jacks are preferred for the production of draught mules. The traditional colour was black with light points, but in recent years light to reddish sorrel with white mane and tail has been favoured for jacks used in crossing with the similarly coloured Belgian draught mares. There is a tendency for sorrels to be of a coarser conformation than black animals and the latter are increasingly rare. Spotted Mammoths are now being used to a limited extent, especially for breeding riding mules, but the typical grey-dun so often seen in small donkeys was not in the original constituent breeds and is not favoured. Grey-dun and spotted were possibly introduced by the use of Standard donkeys of unknown origin. The North American Saddle Mule Association suggests that colour is irrelevant: saddle mules can be seen in all horse and donkey colours and also in various colours and patterns that seem to be unique to mules.

The mules are listed by type, rather than by the size or breed of the horse parent, and include: Miniature mule (up to 50 in high, bred from various types of pony or miniature horse mares); Saddle mule (from 50 in to more than 68 in, bred from riding-horse mares and with riding-type conformation and looks); Pack/Work mule (bred from mares with some draught blood or of heavy work types, rather than for saddle-type conformation); Draught mule (the largest of the mules, bred from various draught-breed mares; generally the larger and heavier the mule, the better, but 'refinement' is also desirable; the most common are Belgian mules, valued for their bright sorrel colour, but there are also mules from Percheron, Clydesdale, Shire and other draught horse breeds); and Gaited mules (bred from saddle-gaited horses such as Tennessee Walker, Saddlebred, Foxtrotter, Paso Fino and Peruvian Paso, with the mares being bred preferably to a jack exhibiting a smooth single-foot type of gait). Gaited mules are registered by the American Gaited Mule Association and may also be registered in the American Donkey and Mule Society (ADMS) registry as saddle mules of gaited breeding.

American Spotted (*USA*)

American donkey breeders recognize a range of coat colours, including the typical grey-dun to brown, black, bay and more uncommon colours such as light-faced roan (red or grey roan), sorrel (usually termed red) and blue-eyed ivory (white coat and pink skin but not pink-eyed albino). Some of the horse colours that are not seen in donkeys include true pinto, appaloosa, palomino and buckskin, but there is a unique donkey spotted pattern of overo-type white splashes on a base colour.

There may also be dappled roan (light face and legs, body marked with 'reverse' dapples, i.e. dark spots on light background), frosted grey (light face and legs with some white hairs in the coat), frosted spotted white (looking almost white, with dark skin: a combination of greying or roan with the unique spotted pattern but with only the skin spotted – the colour does not necessarily show through in the coat itself) and 'tyger spot' (with large spots over the ears, eyes and topline and with the body covered by small round spots like an Appaloosa horse).

It is possible to select for a spotted (pinto-like or pied) coat in many types of donkey, but the term American Spotted applies more specifically as a trademark name for donkeys registered with the American Council of Spotted Asses (ACOSA). Dave Parker, of Billings, Montana, bought his first pinto donkeys in 1967. He and John Conter, also of Billings, began to buy

and trade in spotted donkeys and set up a registry of other spotted donkey owners. This was the beginnings of ACOSA and the Spotted is now an established breed.

American wild burro (*SW USA*)
It is said that the first donkeys in what became the USA were brought into Arizona from Sonora in Spanish Mexico by a Jesuit priest in 1679 (Kane, undated), though in reality the priest in question, Eusebio Kino, did not actually come to the Americas until around 1681 and did not arrive in Sonora until 1687.

Donkeys, known as burros in Spanish and Portuguese, would eventually help in the development of the American South-west by carrying water, supplies, equipment and ore for miners and prospectors, and at the time of the 1858 gold rush in the lower Colorado River valley the pack burros came into their own, hauling supplies to the prospectors' camps and hauling gold back to the towns. Some of them were used in larger mines to haul ore carts underground. However, when prospecting and mining began to decline in the area a few years later, the burros were left to fend for themselves. They quickly adapted to the region's deserts and over the decades they multiplied into large feral populations.

In 1959, Federal legislation was passed to protect the feral burros on open rangelands now managed by the US Department of Interior's Bureau of Land Management (BLM) – not just in Arizona but in ten western states altogether. On those managed rangelands today there are up to 7000 'wild burros' roaming freely, along with around 34,000 feral horses. (Although the donkeys are feral, the term 'wild burros' was used by the US Congress at the time of the 1959 legislation and was retained in the 1971 Wild Free-Roaming Horses and Burros Act; it therefore continues to be used by the BLM and members of the American public.) The legislation was based on the principle that 'wild free-roaming horses and burros are living symbols of the historic and pioneer spirit of the West; they contribute to the diversity of life forms within the Nation and enrich the lives of the American people'. The law also protects the animals from harassment and commercial exploitation.

More than half of the free-roaming burros are in Arizona's arid lower desert areas and almost all of the rest are in the high desert areas of California and Nevada. A 68,000-acre area in Nevada known as the Marrieta Wild Burro Range has been managed for principal use by wild burros since 1991 and is home to perhaps 100 of the animals. In addition there are more than 1000 captured 'excess' wild burros held by BLM in corrals as part of a management programme in which the free-roaming population is maintained at a level that is sustainable for the land and for the animals. The populations are rounded up regularly with the aid of helicopters so that excess animals can be removed from the rangelands and kept in captivity, after which they are offered for adoption to members of the public. In the two decades from 1992, about 7500 burros were captured by helicopter drive-trapping and since 1973 BLM has placed more than 25,000 wild burros into private care. None are slaughtered. As well as mustering and capture, there has been very limited experimenting in population control with contraceptives by darting.

The wild burros are usually around 44 in (112 cm) tall and weigh about 500 lb (say 225 kg). The most common colour is grey-dun or brown with cream points but there are also red, red-roan, 'pink', 'blue' and pinto burros in the wild. They tend to have shorter lives (rarely over 20 years) in the wild than in captivity. They are usually very fertile, with jennies foaling throughout the year and usually each producing one foal a year. Natural predators are few – there are occasional kills by mountain lions – and the population can increase by up to 20% annually, hence the need to remove excess animals before lack of forage or water causes hardship, emaciation, starvation and death.

Ossabaw Island, in the Atlantic Ocean off the coast of Georgia, has been home to a group of feral miniature Sicilian donkeys for many years. In the 1940s the owner of Bull Island, off the coast of South Carolina, imported some donkeys from Sicily for his island, where he also had free-roaming zebra, mouflon and water buffalo. On his death soon after the importation, the donkey herd was dispersed and two jacks, two jennies and a foal were moved to Ossabaw Island, where they were let loose to find their own living and soon became the subject of behaviour studies for university students and researchers. Ossabaw was sold to the State of Georgia in 1978, and by the turn of the century, when the donkeys had multiplied to more than 100, it was decided that they should be removed from the island after nearly 50 years as a closed population and re-homed elsewhere. Individuals that did not meet certain health criteria were allowed to remain on the island to live out their natural lives, but all the remaining males were vasectomized to ensure zero population growth on the island. However, this was not entirely successful: some of the foals born after the depopulation eventually managed to impregnate some of the females and the strategy had to be reconsidered.

Amiatina (*C Italy: Tuscany*)
The *asino dell'Amiata* has zebra-like stripes on its pale legs, in addition to the usual dark dorsal stripe and shoulder cross. It originated in southern Tuscany on the slopes of Mt Amiata (Grosetto province) and is agile, good natured and well adapted to work in the mountains, with good disease resistance and endurance. It is used as a beast of burden and for light draught work and riding. The coat is mouse-grey (agouti) with pale grey points. Height range 123–147/119–142 cm. The Amiatina is one of Italy's eight recognized autochthonous breeds of limited distribution. A herd book was established in 1990 but the breed is endangered, with a population of a few hundred.

Anatolian (*Turkey*)
Anatolia, or Asia Minor, historically forms the bulk of Turkey in western Asia between the Black Sea, the Mediterranean and the Aegean. There are ancient records, dating back nearly 4000 years, of regular caravans of pack donkeys carrying small but very heavy (90 kg) loads of tin and textiles from Assyria (centred in northern Mesopotamia) across the Ashur mountains into Anatolia, where the goods were exchanged for silver and gold and where most of the donkeys were usually sold as being unnecessary for the return journey. The most favoured donkeys were black (*sāllamum*) and sturdy. These 6-week trips covered more than 1000 km and the caravans sometimes included up to 300 donkeys. The donkeys were bred and trained by the Assyrians and they seem to have been available in unlimited quantities: they were the usual means of transport for all kinds of merchandise in the region (such as metals, wool, oil, textiles,

grain, salt, bitumen, precious stones), usually on their backs, but there were also those that were trained in pairs and fours to pull four-wheeled carts loaded with larger quantities of copper, grain, straw and construction materials.

Documentation about this trade in the 19th and 18th centuries BC has been closely studied by several authors in recent years, and so there is detailed information about various words connected with the donkey (*emārum* or *anše*) and descriptions about how they were harnessed, loaded and generally managed (e.g. Veenhof, 1972).

It also appears that the mule (*parûm* or *anše.kunga*) was being used in Anatolia in the same period, probably as a carriage or saddle animal for royalty and other distinguished people. Mules offered a more comfortable and faster ride than donkeys and they were worth four times as much. It is probable that mule breeding was first practised in Anatolia and Mesopotamia, the meeting place for horses of the north and donkeys of the south. Equid hybrids of donkey and horse, or perhaps initially casual crosses of onagers (*Equus hemionus*) with jennies, were noted in archives of the time, such as merchant archives of the 19th and 18th centuries BC found in the ancient town of Kaniš (central Anatolia) and royal archives of the 18th century BC from Mari (northern Syria), and also in tablets of the 13th century BC from the ancient port city of Ugarit (northern Syria) (Michel, 2004).

It is reasonable to assume that the widespread Anatolian donkey of Turkey originated from those robust black Assyrian caravan animals. Black is still a common colour in the Anatolian, though many of Turkey's donkeys are now the standard grey-dun colour with lighter points and black dorsal stripe and shoulder stripe and often with leg stripes. White and brown coat colours are also known: a study of donkeys sampled in the south and south-east of the country found 31.4% grey, 24.7% white, 23.7% black and 20.1% brown, while in the east the proportions were 54.3% grey, 7.4% white, 18.1% black and 20.2% brown (Yilmaz and Ertugrul, 2011). White becomes the most common colour in Turkey's south-eastern areas near the borders with Iraq and Syria, and the donkeys here are also larger than other Anatolian donkeys. In general, donkeys in Turkey tend to belong to smallholders or poorer people and are not well fed; they are of small to medium size, with average heights of 103/100 cm.

As well as the common Anatolian, two other types are recognized in Turkey though there is very little information about either of them and no description. Both are classified as being at risk, but there is no conservation programme for them. The **Merzifon**, or *Marsovan*, is named for a town and district in Amasya province, in the central Black Sea region. The **Karakaçan** is presumed by some to be named for the Sarakatsani nomads of the Balkans and Thrace, but the name Karakaçan can be translated literally as black fugitive (*kara*, black; *kaçan*, one who flees) or, some say, 'one who leaves the woods or moves to uncultivated areas' (*kara* can also mean 'land' or 'earth'), or simply as black donkey; it is also sometimes used as a slang word for donkey. It would seem likely, therefore, that the Karakaçan is the common Anatolian selected locally for a black coat.

Donkeys have been essential to Turkey's agriculture for many centuries but have now largely been replaced by motorized transport and mechanization. In the 1960s there were still around 2 million of them, but thereafter the population declined: in Turkey's 2004 report to the FAO on its animal genetic resources there were said to be 588,000, of which 30% were for draught work (forming 60% of all the draught animals in Turkey, the rest being horses), 40% for 'culture' and 30% for recreational use (forming 25% of all recreational livestock, compared with horses 50% and camels 25%). Other sources state that there were only 296,000 donkeys in Turkey in 2007 and about 234,000 two years later. Yet there were still many more donkeys than horses (160,000 in 2009) and mules (51,500 in 2009). For 2013, the official FAO statistics for Turkey gave 188,789 asses and 47,205 mules (horses 141,422).

The indigenous donkeys are still used as beasts of burden, carrying water, grain, hay, firewood and other goods over short distances in difficult terrain, and they accompany shepherds and their flocks, carrying whatever the shepherd needs. They are also still ridden; and, oddly, Anatolian donkeys were traditionally ridden with the rider mounted uncomfortably towards the animal's rump rather than seated centrally. To a more limited extent they continue to be used as agricultural draught animals on smallholdings in less accessible areas and to pull carts; indeed, in some parts of the country farmers have been tempted to abandon their tractors in the face of high fuel costs and rely instead on donkeys. In the south-east in the old fortress city of Mardin, built on a rocky hillside on what was once the border of Anatolia and Mesopotamia (now Syria), donkeys are used to collect household waste, as many of the city's twisting streets are too narrow for motorized vehicles; the local authority prefers larger donkeys, at about 125 cm tall. However, the Anatolian does not seem to be valued for mule breeding: most of the mule population seems to be imported from Iraq and Iran (Yilmaz and Wilson, 2013). Unusually, in 2012 a farm in the province of Kirklareli in north-west Turkey applied to the Ministry of Health for a permit to sell donkey milk from its substantial herd of 180 donkeys, and milk was also being sold in small quantities from a few other farms elsewhere in the country. There would be little or no market for donkey meat in Turkey, as many of its people are Muslim.

Andalusian (*S Spain: Cordoba*)

The *asno Andaluz* or *raza asnal Andaluza*, known also as *Andaluza-Córdoba*, *Córdoba*, *Campiñesa*, *Cordobés-Andaluz*, *Lucena* and variations on these names (sometimes including the word *gran*), is a large breed that was often used for breeding mules for ploughing, as well as being a working donkey, typically transporting crops.

Well adapted to its hot dry region, the type is thought to have been introduced into southern Spain long ago, possibly originating in Egypt. Recent DNA analysis has shown that the Andalusian and the Moroccan of North Africa form a separate cluster from the black-coated breeds of northern Spain (Catalan, Encartaciones, Mallorquina/Majorcan and Zamorana-Leonesa) (Aranguren-Méndez *et al*., 2001, 2002).

Theories about the origins of the Andalusian abound: in the past, it has been suggested that Egyptian donkeys came into the peninsula with the ancient Iberians; others say that its introduction was later, with the Muslim invasion in the 8th century, and that the type was already known for its size as a good riding animal at the time of the Islamic Caliphate of the 10th century. It was a load carrier on rough tracks and was used

for mule breeding early in its history in Spain, though its progress in this role was greatly hindered by laws prohibiting mule breeding for almost four centuries – it was said that energies and land should be devoted to breeding horses for the army, not mules, and it was not until the 1830s that crossbreeding between jacks and mares was officially permitted. In the meantime the Andalusian had remained a large grey donkey, little known outside its own region, and often referred to as being of Córdoba. It seems that its main centre of development was around the old town of Fernán Núñez in Córdoba province's southern flatlands.

However, during the 20th century its population dropped sharply with the introduction of mechanization, along with the Spanish donkey population in general. For example, in 1960 the government census showed a population of 686,000 donkeys throughout the country and by 1974 this had been reduced to 310,000, of which 68,731 were in Andalusia. Over the next 15 years the Andalusian became endangered, though there remained a good core of jacks bred at the Ecija military stud for mule production. By the turn of the century there were fewer than 100 breeding animals but the Andalusian was officially recognized as a breed by the Spanish government in 2001, the year in which the *Asociacion Nacional de Criadores de la Raza Asnal Andaluza* (ANCRAA) was formed. It remains endangered, but it now has a stud book and at least one association (UGRA – *Unión de Ganaderos de la Raza Asnal Andaluza*) devoted to its conservation as a pure breed.

The Andalusian has a calm temperament and an air of power and strength, with sturdy legs, strong bones and joints and a robust and harmonious conformation. The minimum height at the withers is 145/135 cm and can be as much as 160 cm. Weights might be 360–420 kg. According to the breed standards, the short soft smooth coat over the dark skin is *torda*, meaning the colour of a thrush (pale to dark grey and dappled) and often *torda rodada* (with large round spots on the back and legs that are a darker shade than the rest of the coat), i.e. the grey coat usually has white marks, flecking or darker or paler spots in various forms as the animal matures and with a tendency for loss of pigmentation in black hairs with age.

According to Sotillo and Serrano (1985), the Andalusian is the ancestor of the Brazilian or Lagoa Dorada.

Arcadian *see* Greek
Argentato di Sologna *see* Romagnola
Armenian *see* Caucasian

Asiatic wild ass
The Asian or Asiatic wild ass, *Equus hemionus*, is typically found in desert steppe environments but also in a wide range of habitats. The name *hemionus* comes from the ancient Greek *hemi* (half) and *onus* (ass). There have been many synonyms for the binomial over the years and the taxonomy is often challenged.

There are several subspecies: the chigetai or Mongolian **khulan** (*E. h. hemionus*), the Turkmen **kulan** (*E. h. kulan*) (*see* Mary), the Indian wild ass or **khur** (*E. h. khur*) and the Persian wild ass or Iranian **onager** (*E. h. onager*) (*see* Persian onager). Some sources also identify *E. h. luteus*, or Ghobi khulan, but this is now generally taken to be a synonym for *E. h. hemionus*. There are numerous regional synonyms for the common names, including *anger* or *hemione* (onager) and *Baluchi wild ass*, *ghor-khar*, *ghudkhur* or *thor char* (khur). The Mongolian name *tchikhitei* (i.e. chigetai, with various other phonetic spellings such as *djigitai* and *dzeggetai*) translates as 'long-eared'.

The Syrian wild ass (*qv*) is sometimes classified as *E. h. hemippus* but also as a separate species, *Equus hemippus* (Groves and Grubb, 2011). It was extinct by the late 1920s. The kiang (*qv*) of Tibet was considered to be another subspecies, *E. h. kiang*, but is now seen as a distinct species, *Equus kiang*. It has also been suggested that the status of the Mongolian khulan and the Turkmen kulan as subspecies of *E. hemionus* should be reviewed.

In general the Asiatic wild ass has a yellowish-brown to reddish-brown coat, with paler underparts, and a dark mane and dorsal stripe (usually extending from the mane to the tail tassel) but no shoulder cross stripe. The large Mongolian khulan has a sandy coat grading to light fawn on the underside; the Iranian onager has a pale yellow-brown coat and white underside; the Turkmen kulan has a pale sandy coat (darker in winter) with white underside; and the Indian khur had a much more extensive white area, coming at least halfway up the flanks.

The wild asses of Asia tend to become larger, stronger and heavier towards the east of their range. The Syrian was the smallest and lightest and the kiang of Tibet is the largest and heaviest.

In contrast to the African wild ass (*qv*), the Asiatic species is virtually impossible to tame and has never been domesticated. Speculation in the past that domestic donkeys forming parts of pack trains on the great Silk Road trade routes between the Pacific and the Mediterranean might have crossbred with various subspecies of the Asiatic wild ass on their long journeys seems unlikely: the diploid chromosome numbers in the Asiatic wild ass are in the region of 51–56, compared with 62–64 in the African wild ass and 62 in the donkey.

Equus hemionus is categorized in the IUCN Red List as endangered, as the combined population of the various subspecies had declined by 52% over the 16 years up to 2008 (it had been classified as vulnerable before the 2008 reassessment) (Moehlman *et al*., 2008). The remaining populations are severely fragmented in their distribution. The animals are seasonal breeders; and with females first foaling at an average of 5 years of age and thereafter reproducing only every 3 years, with only a 50% survival rate for the foals, it is difficult to see how the decline can be halted, especially in the face of continued illegal hunting for meat, competition for water and rapid loss of habitat. There have been several projects to reintroduce the species in various regions, along with a successful introduction into Israel of onager/kulan hybrids.

The extensive historical distribution of the Asiatic wild ass had ranged from Mongolia and Tibet to the Black Sea and Red Sea, including Kazakhstan and the Caucasus to Ukraine, Turkey, Syria, Iraq and Iran, into the Arabian peninsula as far as central Saudi Arabia, and also Afghanistan, Pakistan and north-west India. It possibly also extended into Mediterranean Europe. The range had declined significantly by the 19th century and today the largest surviving subpopulation is in southern Mongolia, with about 80% of the total Asian wild ass population. This is the home of the Mongolian khulan, which is now confined to the Gobi deserts and had a population estimated at 17,500–19,300 in 2003, a sharp decline from about 43,000 in 1997, probably due largely to illegal hunting.

The second largest subpopulation is that of the Indian khur, with about 3900 in 2004 in the Little Rann of Kutch and showing a slow but steady increase in population size and range since 1976. In contrast, there are only a few hundred onagers in Iran.

More detailed information on the taxonomy, geographical range, population numbers, habitat, social structure, threats and conservation action for each of the Asiatic wild ass subspecies can be found in Moehlman *et al*. (2008).

Asinara (*Italy: Asinara Island, Sardinia*)
Found on the hilly island of Asinara (about 52 km^2 and located off the north-western tip of Sardinia), this breed is noted for its white coat, pink skin and mucosae, partially pigmented eyes (pink/light blue) and pale hoofs. The colouring appears to be a form of incomplete albinism (Bigi and Zanon, 2008) and synonyms for the breed include *asino albino dell'Asinara* or *asino biancho di Asinara*. These white donkeys have a marked degree of photophobia and their gait becomes unsteady in bright light; they are also predisposed to erythema and dermatitis. They are highly inbred, which has had a negative effect on their reproductive performance. They are small and compact, with a height of only 80–105 cm at the withers (there is little or no sexual dimorphism) and not very muscular (weight 80–90 kg). The head is large with a straight facial profile, the neck is short and slender, the prominent angular rump is higher than the withers and the legs are short but sturdy. The white donkeys have been closely studied by Daniele Bigi and colleagues. Bigi is a researcher at the Faculty of Agricultural Science at the University of Bologna and chairman of RARE (Razze Autoctone a Rischio di Estinzione) Association in Italy, founded in 2002. The Asinara is one of the country's eight recognized autochthonous breeds.

The white island donkeys live in small feral groups and a herd book has been maintained since 1990. There are several theories about their origins, including a suggestion that white donkeys were originally imported from Egypt by the Duke of Asinara in about 1800. There is also a legend that they landed on the island by chance when a ship bound for France sank on voyage, but it is more likely that they were simply typical Sardinian donkeys (they are similar in size) that became isolated and inbred on the island and that the white coat is the result of a random mutation that spread throughout the local population. There is also a population of less approachable grey donkeys on Asinara and in the past the white and grey populations were separate in their natural distribution, with the white animals in the southern part and the grey in the steep, rocky northern part. Since the turn of the century there has been increasing contact between the two populations in the central area of the island and there is a risk that each group will lose its original genetic traits. It is estimated that there are now about 120–150 white and 250 grey on the island; there are also perhaps 40–60 white Asinara donkeys being reared in *ex situ* farms in Sardinia and mainland Italy. The Asinara donkeys share some distinctive genetic traits with the grey Sardinian Dwarf (*qv*) that separate them from other Italian donkeys.

Whatever their true origins, the donkeys were abandoned when the island became state property in 1885 and the inhabitants (about 100 Sardinian shepherds and Ligurian fishermen) moved to the nearby Stintino peninsula. The island had been a quarantine station and later became home to a prison and penal colony until the late 1990s, but is now uninhabited and has been a recognized national park and nature reserve since 2002. There is an agreement between the park authorities and Sardinia's Forestry Agency and Sassari's Faculty of Veterinary Medicine to ensure that the state of health of the animals is constantly monitored in order to preserve the genetic heritage of the Asinara donkey.

Although the name of the island is widely interpreted as 'inhabited by donkeys', it seems that in Roman times it was called *insula sinuaria* because of its sinuous shape and this might be the origin of its name. The island is thickly vegetated (mostly maquis) but trees are very scarce, and fresh water is also scarce.

Atbawi *see* Sudanese
Auraki *see* Nigerian

Australian Teamster (*Australia*)
According to FAO statistics for 2013, Australia has only 2000 donkeys and no mules. This takes absolutely no account of the country's huge feral population of donkeys.

The history of the donkey in Australia has been examined by Bough (2006), among others. In 1791, Lt Governor King in New South Wales requested that a quantity of asses should be brought in from the Canary Islands and in 1792 Governor Philip requested 'from 15–20 asses', though there is no evidence of any positive response to their letters. In 1793, the *Shah Hormuzear* under Captain W.W. Bampton arrived in Sydney from Calcutta on a speculative trading voyage and landed its cargo of livestock, including about a hundred sheep, four horses, a few goats and three asses (three others had died on the voyage). These were the first donkeys known to reach Australia. The same ship was subsequently chartered by the colonial government and the acting Governor of New South Wales drew up a contract for 'one mule and two female asses'. In 1794, three asses from the *Shah Hormuzear* are recorded as setting foot on the colony's soil and in 1795 Captain Bampton returned with cargo that included four asses for the government and three private stock.

Here and there over the next few years there are records of a few asses being used in various parts of Australia. Mules imported from Chile were being used to carry flour in New South Wales in the 1840s. In the late 1850s and early 1860s Honolulu exported at least 32 donkeys and 68 mules to South Australia. From about the 1860s, with the opening up of western and central Australia, the species would play an increasingly important role in Australian transport, typically working in large teams in the outback, where the adaptations of their desert ancestry were invaluable. Like the camels that were also used, donkeys were far better suited than horses or bullocks to coping with heat, inadequate nutrition and lack of drinking water. They were quick to learn and responded well to verbal commands from the teamsters who walked beside the wagon trains; they worked staunchly in harness; and they had the added advantage of not straying far from the wagons at rest – they did not need to be hobbled. They were also immune to redwater disease (carried by ticks and attacking bullocks in particular) and to 'Kimberley walkabout' disease (poisoning from foraging on peabush, which killed horses). The teams hauled everything from timber to iron tanks, mining ore, wool, beer, boilers for the

mines, provisions for mission stations, household belongings, building-stone and food supplies. Later, during two world wars, donkeys and mules were used in large numbers in various overseas arenas. For example, in World War I donkeys were famously used by ANZAC stretcher bearers at Gallipoli to carry wounded soldiers to safety. In World War II donkeys from Australia worked as pack animals on Papua New Guinea's rugged and challenging Kokoda Track and in many other theatres of war.

Over the first 150 years or so, imports had come from many different parts of the world – mostly India (especially Rawalpindi) but also Africa and North, Central and South America. In the 1860s, landowner and philanthropist Sir Thomas Elder introduced camels from India into Australia's dry regions. He was, inter alia, an ardent breeder of race horses but also bred donkeys, mostly based on strong tall Spanish types, sometimes from Castille: it is recorded that he imported donkeys to his Beltana Station in the Flinders Ranges, South Australia, in 1866 and more would follow. The donkey stud at Beltana thrived for at least half a century thereafter and two imported Castilian jacks were being used at Beltana in 1912. In the late 19th century there are records of large Andalusian, Maltese (first imported in 1860) and American Mammoth Jackstock donkeys being brought into Australia; the last known import of these large breeds was in 1935. In 1904 the Western Australia government had imported donkeys from Mauritius and Sumatra. Claims have also been made that many of the donkeys in the north of the continent were brought in from Asia. Thus Australia's teamster donkeys evolved from many sources that combined to produce a type that was perfectly adapted to the challenging conditions of working in the outback.

As in so many other countries, motorized transport and agricultural mechanization in the 20th century led to the demise of the teamster donkey and the mule in Australia and many good animals were simply turned loose to become feral. In these circumstances, they thrived. For example, from a single team of 40 donkeys released into the wild in the McArthur River area (Northern Territory) in 1936, the feral herd had increased to around 1500 by the 1970s. They had been greatly appreciated as working animals, but they were also greatly resented for their very success in the wild and even in 1930 the feral herds were beginning to be described as pests. In the Kimberley, Western Australia, they were officially recognized as a pest in 1949 and many thousands of feral donkeys became the target of government eradication programmes annually, which have continued throughout Australia. In the 1960s large numbers of donkeys were being slaughtered for the pet food industry.

In 2004 it was estimated that there were 5 million feral donkeys in Australia. The main methods of control now include aerial platform control (effective, environmentally friendly, humane if carried out by fully trained shooters, but expensive and wasteful), trapping or mustering donkeys to be sold for commercial purposes (effective but expensive and time consuming over large areas), culling on the ground (cost effective but limited to accessible terrains) and fertility control (non-lethal but of limited use, difficult to administer to large numbers and needing to be repeated frequently to be effective).

In the 1970s there were efforts to export a few of the resilient, self-sufficient bush donkeys to New Zealand; and in 2009 it was proclaimed that a new market had been negotiated with the Chinese for wild donkey meat and for 'edible donkey skin' (used in traditional Chinese medicine): the animals could be mustered and then processed at existing kangaroo abattoirs in Queensland. The practicalities and costs, however, were a major challenge for this new venture and consideration was given to channelling feral donkeys into livestock farming systems instead.

In the 1970s, with mustering for transport of ferals in huge numbers to the abattoirs, Australians began to take more notice of donkeys. In 1972 the Australian and New Zealand Donkey Breed Society was formed, catering mainly for owners who saw donkeys as pets and were acquiring their animals in large numbers through dealers and horse markets. The society had about 660 members in 1978, and by 1981 more than 2400 donkeys had been registered in Australia and there were nearly 100 studs. A stud book was started for Australian donkeys in 1973, when all of them were of a similar type and size and the only categories were by colour. At the time, there had been no imports since the 1930s. In 1975 New Zealand formed its own society (importing a number of Australian ferals, known simply as 'Australian' donkeys) and the home organization changed its name to the Australian Donkey Breed Society, changing again later to become the Affiliated Donkey Societies of Australia (ADSA).

In the mid 1970s some people began to import English and Irish donkeys, mainly in the hope of achieving broken colour in their herds, and in 1976 an English Donkey Society of Australia was founded for those who had imported purebred **English/Irish** donkeys, with its own stud book. In 2002 this society created a separate register for Miniature Mediterranean donkeys and in 2003 its aims were extended to include all other breeds of donkeys in Australia and also mules. In 2004 the society's name was changed from the English & Irish Donkey Society of Australia Inc. (EIDSA) to the English & Irish Donkey Society of Australia All Breeds Register Inc. The name was changed again in 2008 to the Donkey All Breeds Society of Australia Inc. (DABSA), which now maintains registers and stud books for the English/Irish, the Australian Miniature and the Australian Teamster, along with American Mammoth Jackstock and American Miniature Mediterranean. Various state societies in Australia are affiliated with DABSA. There is some confusion about the overlapping registries of ADSA and DABSA.

The name **Australian Teamster** was first formalized by EIDSA in 2005, when a register was created that separated these bigger donkeys from the smaller, sturdy English/Irish. The historic links are important and the register does not allow animals with known outcrosses to English, Irish or Miniature donkey. It has two sections: one for Teamster A (with some proof that links the animal to the type's origins, e.g. that it is from breeders' stud stock or station stock) and one for Teamster B (inspection is required if there is no known proof of such links). Outcrosses of up to 25% are allowed with other recorded breeds used in the type's early development, such as Andalusian, American Mammoth Jackstock or Poitou. It is still possible to identify superficial evidence of these original ancestors in today's Teamster; for example, dappled or roan coats from the Andalusian, or black and occasionally red from the American. The Australian Teamster is now of medium size, or

large standard, and is no longer a serious working animal. Instead, it is used recreationally, whether in harness or as a pack or saddle donkey, and as a companion animal.

In the 1990s, the first imports of American Miniature Mediterranean donkeys (maximum height 90 cm) arrived in Australia. They had originated in Sicily and Sardinia (*see* Miniature). The DABSA register for these very small donkeys is restricted to animals that were born in and imported from the USA. Its **Australian Miniature** registry is based on height rather than breed and is open to not only American Miniature Mediterranean but also English/Irish donkeys or any other miniature as long as it meets the height criteria: at maturity (5 years of age and over) Section A donkeys must be 36 in (91 cm) or under, and Section B must be 36–38 in (91–97 cm).

Austro-Hungarian Albino (*Austria, Hungary, Germany*)
Also known as the *Baroque* (or in German as *Barockesel*, *Österreichisch-Ungarischer Albinoese* or *Österreichisch-Ungarischer Weißer Esel*), this medium-size pale yellow or cream-coloured (*cremello*) donkey is almost extinct. Its skin is pink rather than pigmented, its eyes are blue (it is not an albino, despite the name; it exhibits a pale form of flavism, i.e. with a yellow tinge, rather than albinism), its coat is soft and its conformation is finer than the common donkeys of the region. It was originally bred in the Baroque period of the 17th and 18th centuries by wealthy estate owners in the Austro-Hungarian Empire, mainly to please noblewomen and children. Its rarity has been partly due to a low reproduction rate and susceptibility to disease and it had vanished, or at least been forgotten about, until 1986, when Professor Fritz Dietrich Altmann rediscovered the type in Herberstein Zoo in Styria, Austria. The zoo had been opened in the grounds of Herberstein Castle in 1960. Altmann suggested that the zoo's white donkeys had originated in Italy (*see*, for example, Asinara) and had been brought into Austria via Naples during the Baroque. A few other white donkeys were discovered in Hungary by Kirt Kirchberger, director of the Lake Neusiedl national park on the Austro-Hungarian border (the lake is known in Hungary as *Fertő tó*), and were bred with the Herberstein animals to form the foundation of the present population. The two largest herds, with about 20–30 animals, are in the Neusiedl park and at Herberstein and have proved to be resilient and healthy. The breed remains very rare with only a few hundred individuals worldwide and only around 200 breeding animals registered in the stud book established by the *Verein zur Erhaltung der Weißen Barockesel* (Association for the Preservation of the White Baroque Ass). There are breeders in Austria, Hungary, Germany, Switzerland and Spain. Some of the donkeys are used for trekking and carriage driving.

Azerbaijan *see* Caucasian
Baio Lucano *see* Italian
Baladi = native, indigenous (Arabic); *see* Egyptian; Jordanian

Balearic (*Spain: Majorca, Balearic Islands*)
The *asno Balear* is the western Mediterranean donkey of Spain's Balearic islands (*Islas Baleares*) off the country's eastern coast. It includes the **Majorcan** or *Mallorquí* (or *Mallorquina*) and is also found in Minorca; hence the name Balearic has been preferred to Majorcan since 2006. It probably originated from the Catalan (*qv*) and it is used for mule breeding (its main traditional role), as a draught animal in market gardens, to control vegetation in forest and scrubland areas and as a tourist attraction (it is popular for excursions into the mountains). In the late 19th century it was exported to the USA, where it contributed to the formation of the American Mammoth Jackstock of Kentucky.

Noted for its longevity, strength and rusticity as well as its size, it suffered a similar fate to other Spanish donkeys in the second half of the 20th century with the advance of mechanization and its numbers dropped dramatically. An association was formed in 1990 to rescue and promote the breed, with a nucleus herd of 50 animals, and it was formally recognized as endangered in 1997. A stud book for the Majorcan was established in 2002. In 2007 there were only about 200 of the breed remaining. It is monitored by the *Associació de Criadors i Propietaris de Pura Raça Asinal Mallorquina* (ACRIPROASMA).

Typical heights are 145–155/125–135 cm at the withers (minimum 140/130 cm; average male weight 360 kg) and the general conformation is similar to that of the Catalan but finer boned. The Balearic has quite a long head with a slightly tapered muzzle, large muscular mobile ears, a broad forehead and large expressive eyes; the legs are robust and with strong bones and there is a long tail with an abundant tassel. The coat is usually described as raisin-black, with white to grey points.

Balkan (*Balkan peninsula*)
Southern Europe's Balkan peninsula, edged by the Adriatic, Mediterranean, Aegean and Black seas, geographically includes countries such as Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Macedonia, Montenegro, Serbia and Slovenia, and is sometimes taken also to include Romania and Moldova. In much of the peninsula the donkeys are unimproved, uncharacterized and uncounted, representing a melting pot of random mixed breeding, but are valued for their willingness to work. Only Albania, Bulgaria, Croatia and Greece report donkey numbers to the FAO and in 2013 these were, respectively: 55,000 (plus 8000 mules); 35,000 (plus 3000 mules); 3000; and 43,000 (plus 22,000 mules). As in so many countries, these numbers are not necessarily reliable and are also only a fraction of the populations half a century ago (*see* Table 1).

The donkeys of the peninsula are broadly described as of the Balkan type, or 'domestic Balkan ass' (*domaci balkanski magarac* in Serbia), and are quite small, especially in mountain areas with average heights around 100/95 cm and weights 250/200 kg. Coat colours are variable, including grey, dark grey, brown and chestnut, usually with dorsal and shoulder stripes.

In Serbia, most of the Balkan donkeys are near the north Serbian towns of Sremska Mitrovica and Kovilj in Vojvodina province and also in the Stara Planina mountain region; they are used for transport and also for milk (including cheese) and meat, but their numbers are probably fewer than 1000. About 100 are maintained in the Zasavica Special Nature Reserve, an area of preserved wetlands that also has Podolian cattle and feral Mangalitsa pigs and does not sound ideally suited to donkeys. Zasavica Reserve sells a special Balkan donkey cheese that is said to be the most expensive cheese in the world; it also sells donkey-meat sausages, donkey milk, and an alcoholic liqueur, soaps and face creams made from the milk. The Balkan donkeys appear to be taller in Serbia, with average heights given as

120/110 cm and weights 235/180 kg. The body is described as 'elongated rectangular', the head 'rough' with long upright ears; the muscles are described as 'spindle-shaped and strong, not abundant' and bone protrusions are easy to observe. The colours of the Serbian donkeys are given as 'usually pale (blue or reddish), the cormorant or chocolate colour' ('cormorant' presumably implying black). Less lyrical sources give the Serbian donkey's colours as grey, brown, dark grey or reddish brown.

The so-called **Herzegovinian** is a typical small Balkan donkey, grey to brown with a dark dorsal stripe and shoulder cross. It is almost extinct and there is a reserve herd in west Herzegovina near Mostar at the Buhovo genetic centre, Široki Brijeg. In September 2012 the Croation regional development agencies authorized a project of 'sustainable development of the border regions through preservation of autochthonous breeds and establishment of gene centres in Buhovo and Biokovo'. Thus the Buhovo centre is part of the transboundary cooperation programme between Croatia and Bosnia and Herzegovina with the aim of protecting natural and agricultural autochthonous resources in Biokovo Nature Park and was established to conserve indigenous breeds in danger of extinction, specifically the Illyrian cow and the 'Dalmatian' donkey (i.e. Littoral-Dinaric, *see* Croatian). The Biokovo project is part of the ambitious transboundary Dinaric Arc Parks conservation project led by WWF's Mediterranean programme financed by Norwegian MFA and the nature conservation MAVA Foundation of Switzerland. The Dinaric Arc is a region of south-eastern Europe stretching from Italy (Trieste) to Albania (Tirana) and covering large parts of Slovenia, Croatia, Bosnia and Herzegovina and Montenegro.

In some Balkan countries there have been attempts to characterize different types or breeds; *see* Albanian; Bulgarian; Croatian; Greek.

Baluchi wild ass *see* Asiatic wild ass
Basque *see* Las Encartaciones
Belgian *see* European
Benderi *see* Iranian
Berga *see* Catalan

Berry Black (*C France*)
The old province of Berry, a medieval duchy in central France, now comprises the departments of Cher and Indre. Big 'ford donkeys' and 'cemetery donkeys' were well known along the Canal du Berry in the mid 19th century (and well before that time): they hauled barges along the canals, pulled carts, and worked in the fields and vineyards for Berrichon peasants. They had been selectively bred for size, strength, docility and vigour over many decades and were still abundant in the first half of the 20th century.

The local Berry Black donkey now known in France as *Grand noir du Berry*, or simply *Grand noir* or *âne du Berry*, has a coat that is all-black (*noir*) or black with light points (*noir pangaré*), with no dorsal stripe, shoulder stripe or leg stripes. More rarely, the base colour is dark bay. It was a traditional draught and ploughing donkey for small farms and its docility means that it is now also used as a carriage puller, pack and riding donkey for tourists and in onotherapy as well as in mule breeding. Its strong legs are well adapted to rough terrain and it is a hardy animal with a strong neck, straight back and rounded hindquarters. Heights are 135–145/130–140 cm at the withers.

There is a conservation programme for this handsome endangered breed, the total population of which in 2004 was 155. There are currently around 1000 animals registered in the stud book. The breed society *Association Française Âne Grand Noir du Berry* (AFAGNB) evolved from Whit Monday gatherings of enthusiasts in the village of Lignières in south Berry from 1986 and was formally established in 1993, when breed standards were agreed with the help of the National Stud (now IFCE) and by which time some 220 'big black fiery' donkeys were attending the annual gatherings. The breed was officially recognized in 1994; it was only the second donkey breed to have been recognized in France, the first having been the Poitou in the 19th century. About 60% of the registered population in the stud book is now localized in the Boischaut natural region in southern Berry.

Biyang *see* Miyang
Black *see* Jordanian

Bourbonnais (*C France: Allier*)
One of several endangered French breeds, the Bourbonnais has a beige brown to chocolate-coloured coat with black dorsal stripe and shoulder stripe (described in French as *croix-de-Saint-André*), pale grey underside, grey 'doe' muzzle (*nez de biche*, preferably with tan edging) and pale eye circles. There may or may not be zebra stripes on the sturdy, bony legs. The facial profile is straight, the ears are long and upright, the back is straight and muscular and the hoofs are broad. Height ranges at the withers are 125–135/118–128 cm. The Bourbonnais was recognized as a breed by the French government in 2002 and there is a conservation programme. The total population in 2004 was about 200, with 36 registered in the stud book maintained by the *Association française de l'âne bourbonnais*. At the end of the 19th century there had been more than 7000 donkeys in the region. In the past the Bourbonnais was widely used by farmers and sharecroppers for agrarian work, including ploughing, harrowing and haymaking on small plots, and as a means of transport. Today, robust and docile, it is a companion and leisure donkey rather than a working farm animal.

Brazilian (*Brazil*)
Brazil has one of the world's larger donkey populations (about 915,000 in 2013) and even more mules (1,239,000) and the situation has not changed much over the past 50 years. The country also has the world's third largest horse population. Brazil's report to the FAO on its animal genetic resources, published in 2003, gave a donkey population of 1.24 million and a mule population of 1.35 million; the great majority of the donkeys (1.14 million) were in the country's North-east region, which also had the highest proportion of the mules (687,000), whereas horses were evenly distributed over most of the five regions. The North-east has a tropical dry climate; most of the region is semi-arid and characterized by xerophytic vegetation and is known as the Caatinga biome. The smallest numbers of donkeys (about 5000) and mules (about 68,000) were in the South region, which has a mild subtropical climate and whose pastures support many European breeds of livestock, especially beef cattle.

There is also a considerable number of mules in the South-east region (temperate in the south, semi-arid in the north), which is the home of two important Brazilian donkey breeds used in mule production.

In 1945, in his book *Breeding Mules*, Dr Francisco Peixoto de Lacerda Werneck remarked on how important the mule was in the exploration of Brazil: 'The mule will always be, in Brazil, the pioneering pathfinder of the outback, as he is the first to reach the end of the thorns, carrying the tent, the kitchen and the rations of the explorer or land measurer; it is he who carries on his back the first harvest; he, who, except for the first plough, wakens the raw earth; he who works the rustic press to produce the first brick; he who makes the wooden mills turn to give sugarcane juice used to make common treacle candy and the "sugar of the day", of common use by the outbackers. Someone will remember that these functions can be carried out by the ox, but there is always the mule, because the former depends on the latter to lead him.'

From the mid-18th century, mule convoys were the main means of transport in the colony; and in the 19th century and well into the 20th, pack-mule trains were essential in Brazil, carrying everything from diamonds, gold, iron ore and other minerals to cotton, coffee, sugar and milk. Rio Grande de Sul, in the far south, was a major breeding centre for mules and the animals were taken by drovers in huge numbers, hundreds or even up to a thousand in each convoy, to the main market in Sorocaba (in south-east São Paulo) at which about 30,000 mules were traded annually at the beginning of the 19th century and from which the animals were distributed to all parts of the colony, especially central southern areas but also to the north. Whereas in the USA everything was transported by carts and wagons, in Brazil everything was carried by pack mules. Mules also hauled most of the urban carts and rural wagons but the animals were small in comparison with American mules, because the mares and jacks from which they were bred were not large, even though good jacks had been imported from Spain, Italy and France. The centre of production later shifted to Minas Gerias, São Paulo and Bahia.

Most of Brazil's own breeds of livestock originated from animals introduced by successive colonizers almost as soon as the continent was first settled by the Portuguese in the early 16th century. It is usually assumed that donkeys first arrived here in 1534 and that they initially came from Madeira and the Canary Islands. More arrived in 1549 from Cape Verde (colonized by the Portuguese from the second half of the 15th century) and settled in the state of Bahia. Later during the colonial period there were introductions of Spanish and African donkeys and in the 20th century Italian and Spanish donkeys were imported.

Various types or breeds developed by adaptation in different environments by a process of natural selection whereby they became suited to certain ecological and working niches and they came to be described as naturalized, or criollo. Three naturalized donkey breeds are known in Brazil: Jumento Nordestino (North-eastern Donkey), Jumento Brasileiro (Brazilian Donkey) and Jumento Pega.

The ancestors of the **Nordestino** rapidly adapted to the semi-arid environment of the North-east and over the centuries they became useful draught animals in the fields and in the towns and were also ridden. In 1954 large numbers of Nordestino donkeys were sacrificed in the interests of creating an anti-rabies vaccine. In 1967 there were about 2.7 million donkeys in the North-east but there was another major reduction to only 700,000 by 1981, largely through indiscriminate slaughter for the export of donkey meat (as petfood) to Japan and Europe. Numbers climbed back to 1.25 million by 1992. The Nordestino donkey, also known as *Jegue* (a word derived from the English term 'jack', at a time in the 19th century when the English were involved in building the North-east's railways) or *Jerico*, is not a threatened breed today but a conservation nucleus herd is maintained by the Agricultural Research Corporation of Rio Grande do Norte. The donkeys continue to be used in the outback to a more limited extent in a variety of roles and are often neglected. The Nordestino is smaller than Brazil's other two breeds at 90–110 cm at the shoulder. Coat colours include grey, agouti and purple-brown.

In contrast to the Iberian origins of the Nordestino, the **Brasileiro** (found mostly in the South-east and North-east regions) is sometimes said to have originated from imported Italian donkeys, mainly from Sicily. They were subsequently crossed in Brazil with donkeys from Portugal and its African colonies, with breeding nuclei in São Paulo state: the offspring of the crosses were known as **Paulista** donkeys. A breed association for the Brasileiro was formed in 1939. The donkeys were hard workers in the fields and are still used as riding animals for long journeys and for mule production. This robust, lively, agile and well muscled breed is now threatened and a nucleus herd is maintained at the Animal Production Experimental Station of Colina, São Paulo. The Brasileiro has average heights of 120/115 cm, weight 300–350 kg, and its short coat is of various colours, including *ruã* (roan, the most favoured), *baía* (bay) and *tordilho* (dapple grey). The head has a rectilinear or subconvex profile but is never sharply tapered; the eyes are relatively small and oblique; the ears are large, upright and with recurved tips; the body is compact and of good length; and the legs are lean with strong joints. The Brasileiro's conservation status is 'threatened'.

The third Brazilian breed is the strikingly different and larger **Pega**, used most widely in the South-east region. It is also known as *Lagoa Dourada* after the mining area in Minas Gerais in which it was developed to meet the needs of the mining industry that developed in the 18th and 19th centuries. The breed's history dates back to 1810, when Father Torquato, a Portuguese priest, started selectively breeding donkeys, thought by some to be of Italian and Egyptian origin (though claims are also made for the Andalusian as an ancestor of the 'Lagoa Dourada' donkey). He and his successor Colonel Jose Eduardo Rezende, who purchased a nucleus herd from Father Torquato in 1847, were well aware of the value of mules in their remote mountainous region and the Pega is known as a good mule producer. A breed society was formed in 1947. The name Pega originates from the brand hot-stamped on each donkey in the form of a *péga*: two iron rings with chains with which the ankles of fugitive slaves were shackled. The colours of the breed's short soft thin coat is often mouse-grey but includes roan, *rosada* (pinkish), pale to dark grey and more rarely dapple grey. An important part of the breed's standards is that the head should be long, narrow and refined, with a short broad forehead, and the spear-shaped ears should be large, long,

upright, forward-facing and parallel: this noble-looking breed is instantly recognizable by the head and ears. It has long strong legs, a long muscular neck and slender elegant body. Average heights are 130/125 cm, weights 300/240 kg. The Pega is now found on large farms throughout the country and produces strong, light-coloured mules that are used as traction and riding animals. It is known for its docility, liveliness, endurance, rusticity and longevity. Its main use is to produce 'gaited' mules, which offer a smooth and comfortable ride for trekking, competitions and daily work with cattle. It is also used on smaller farms to transport loads and pull carts.

Brasileiro *see* Brazilian

British (*England and Wales*)
It is believed that donkeys were first introduced into Britain by the Romans and persisted over the centuries, largely unremarked but always useful as pack and draught animals over most of England and Wales (they were never very common in Scotland). Donkeys and mules were occasionally mentioned in the Domesday Book (ca. 1086) and at the time there were more than 5000 mills of various kinds in England, some of them powered by donkeys or oxen. Donkeys became more common in Britain in Elizabethan times (1558–1603), when donkey carts were introduced. Eventually the spread of the British empire must surely have increased awareness of the usefulness of donkeys, albeit in warmer and drier climates, and encouraged their use in the homeland.

In 1771, a donkey died of old age at Carisbrooke Castle, Isle of Wight, having worked for 45 years on the castle's treadwheel to raise water from a well (the castle's only water supply) some 49 m deep. This was a typical application for English donkeys over the centuries, powering machines that raised water, threshed grain, ground flour, puddled clay for brickmaking, pressed apples for cider, tanned leather, stamped metal, crushed mine ore and stones and so on, as well as carrying loads on their backs and pulling carts and sledges. Towards the end of the 18th century Samuel Skey Esquire of Spring Grove, near Bewdley in Worcestershire, kept a good many mules, some of them 15 hands (152 cm) or taller and some 'nearly a milk white' in colour, the most beautiful of which were reserved for drawing his carriage. All of Skey's farmwork on the estate was done by mules. There were many other examples of the use of mules and donkeys on landed estates of the period. Donkeys also carried turnips to feed livestock, hauled canal boats, worked in droves of 30 or more loaded with bags of sand from the coast to other parts of the country and so on.

British donkeys were perhaps at their most numerous in the 19th century, widely used on farms and in villages, towns and cities, and they became a common sight as pack animals in the lanes or pulling carts in the streets. They delivered a range of costermongers' goods (mainly fruit, vegetables and fish) and in the 1840s there were at least 2000 coster donkeys in London alone, six times as many as coster ponies. They delivered milk from pack-churns and carts, and in some cases jennies were themselves milked in the street: physicians advised that ass's milk was ideal for invalids and 'weaklings' and there was a firm in London (Dawkins of 66 Bolsover Street, Marylebone) that had reputedly been selling ass's milk since 1780 and also 'jobbing out' in-milk jennies (with their foals) to families, 'sending them far and wide into the country, accompanied with full printed directions as to how to milk and treat them' (Gordon, 1893). By the 1860s Mrs Emma Dawkins was the only person in London licensed to sell ass's milk; she kept her donkeys in Regents Park and brought them into underground stables for milking. She bottled the milk and sent the bottles to customers far and wide, often by rail. A donkey yielded about a quart a day but by the 1890s there were only about 50 'milch asses' still being milked in London.

Another form of 'jobbing' in London was with draught and riding donkeys. In some cases there were studs of up to 50 animals, though more often around ten, with the donkey masters hiring out their animals for a month or so. Riding donkeys were not numerous; in London only 50–60 drivers held licences to allow their animals on the city's open spaces, with each licence covering up to five animals. There was no special breed for riding; it was simply a matter of whether a donkey's shape and size made it more suited to being ridden or to being a draught animal. It was noted by Gordon that the 'ancestral stripe' was gradually being bred out of British donkeys.

Whatever their role, most London donkeys worked for about a dozen years before being delegated to working in rural areas. Beyond London, donkeys were ridden by shepherds and coal miners, as well as by children on beaches; they worked on farms; they carried goods to and from market; they pulled lawn mowers on country estates and rubbish carts in the towns; they accompanied tinkers and tramps on their travels; and paired mules (preferably white) were used to draw the carriages of wealthy landowners.

Every year several thousand donkeys were bought and sold at Smithfields and later Islington's cattle market, where there was a London donkey exchange on Friday afternoons, with most of the animals coming in from Ireland and travelling on the hoof in herds of a hundred or more or, later in the 19th century, in truck-loads by rail. The Irish donkeys (*qv*) were noted for wearing heavy shoes, which English buyers would instantly replace with lighter ones. Many more animals came to this London donkey market from Wales, which was said to breed Britain's best donkeys in the late 19th century, some of them fetching as much as £30 in Islington. It had become increasingly less profitable to breed donkeys in England, largely because of the enclosure of the commons on which they had so long been reared and maintained on free pasturage that was no longer available to their owners.

The trade in donkeys at Islington was worth about £7500 per annum. The donkeys sold there went to owners not just in London but also in seaside resorts such as Brighton and Margate. In addition there were many private sales and it was estimated by Gordon that there were about 13,000 donkeys in London alone in the 1890s.

The good Victorian donkey was seen as a 'better servant than a bad horse'; it would, in proportion to its size, bear a heavier burden and pull a greater weight; it would eat less than a quarter of a horse's intake and would live at least twice as long as a horse. However, at its final demise the donkey was despised by the knackers that willingly accepted dead or dying horses. Knackers claimed that donkeys were hardly worth the cost of their carriage: they were worth only a few shillings for hoofs, bones and, chiefly, skin. The skin was mainly converted into

shagreen leather and memorandum tablets, or occasionally drumheads, and the flesh was deemed to be worthless. 'It is only the Persian who will eat ass's flesh, and even he must have it wild, after hunting it, as if asses were deer,' claimed Gordon. He also mused on the use of the word 'donkey' rather than 'ass' and decided that, 'though ass is the more scientific – and Semitic – it is the more unpopular, owing apparently to the old Egyptians, who originated the libel of the animal's stupidity, and to the Mediaevalists, who made him the symbol of St Thomas. With us he is the great ass, for English is the only language in which the old word does not appear as a diminutive; even in Latin he is *as-inus*, and in German he is *es-el*. Ass sounds so very exclusive amongst us, while there is something pleasant and companionable about donkey, for a double diminutive always shows appreciation.' Gordon remarked that some of the London donkeys were 'very little, though they are not so small as those in the ownership of low-caste Hindoos; and they would look mere dwarfs by the side of the big Spanish donkeys used by the Marquis of Salisbury in his Hatfield haycarts, which must stand at least thirteen hands.' At the time, Spanish and Calabrian donkey jacks could fetch £200 when exported to Kentucky for mule breeding, and they ranged in height from 14 to 15 hands (142–152 cm).

Gordon claimed that the English donkey was a better animal than it used to be; it was bigger and healthier, better fed and did more work. This was partly due to the Victorian innovation of donkey and mule shows, particularly a triennial one held at the People's Palace in London's East End, where donkeys arrived with barrows loaded up with vegetables, fish, firewood or whatever else the costermonger (or 'commercial traveller', as he preferred to be called) made his living from. Some of the donkeys were thoroughbreds with pedigrees going back several generations and Gordon believed that the starting of a donkey stud book would be an event of the 'near future'.

In 1864 the Directors of Islington's Agricultural Hall had instituted a Donkey Show to counteract the rather poor image of the costermonger's ragged ungroomed donkey. On display were 'donkeys as big as average-sized horses, donkeys with coats almost as sleek and fine as that of a racehorse, donkeys with intelligent and even intellectual countenances, donkeys whose whole aspect is that of orderly, selfrespecting, and contented members of animal society' (*Spectator*, 13 August 1864). It was inspired by a movement to 'lessen the sufferings of the much-enduring donkey', and it was driven by Miss Burdett Coutts, the Bishop of London, the Prince of Wales (who exhibited his own 'magnificent' white Egyptian donkey) and other 'noblemen' of the time. However, even this interest from the nobility did not ignite a passion for donkey breeding in Britain.

The donkey was never taken seriously by British breeders in the home countries. Most of the animals in the 19th and early 20th century were bred in Ireland, but in England and Wales they were bred only on the smallest farms, where their owners were unable to afford horses, and the breeding was random – the donkeys tended to be left to find their keep on the commons and verges, and to breed as and when they could find a mate. Agricultural writers were well aware that donkey improvement was theoretically possible, and that even in England there were some with lighter heads, or higher withers, or firmer loins, or better legs and feet than the average and that these qualities could be retained and improved upon by more careful breeding. But there appeared to be no wealthy patrons interested in breeding donkeys, nor any government support, largely because horses were preferred for work and because donkeys were used solely for work; they did not produce meat or, to any serious extent, milk. The one attraction for improvement was in breeding donkeys for mule production, but this opportunity had already been seized upon for many years by the French (the Poitou) and the Spanish (the Catalonian, Andalusian, Majorcan and Maltese) and no one in the UK or Ireland took up the challenge.

Yet all over the old British empire, the British military valued donkeys and mules. Donkeys were regarded by the army as excellent pack animals, needing comparatively little attention or rations, and particularly hardy and useful if they were not overloaded or overdriven. They could cover 15 miles a day at an average pace of 2.5 mph and were typically saddled with a bolster stuffed with straw and supple sticks or canes; the bolster was doubled in the centre, its sides tied close together and the bend of the bolster placed well in front of the withers so that they and the spine lay in the space between the doubled portions, on which the load was supported. A thick layer of blankets above and beneath the bolster formed a protective pad. During World War I, British cavalry regiments were affectionately referred to as 'donkey wallopers' by other regiments.

However, it was the mule that was the favourite of all military pack animals abroad; it was often used as a draught or riding animal as well but it was best known as a pack carrier. Mules had great endurance, tolerated thirst, could put up with changes of climate and food and were not fastidious about the latter. 'The shape of his back makes it easy to fit him with a saddle, while the toughness of his hide helps to preserve it from galls. Mules are usually cheerful, intelligent animals, appreciate proper handling, and resent violence. . . . Their one drawback from a military standpoint is their liability to stampede under fire. This, however, may be largely overcome by training' (*Animal Management*, 1923, Veterinary Department of the War Office). On marches mules could be led or driven and could be trusted to carry bulky loads on narrow roads and steep hills 'with perfect safety'. The average pace of a mule transport was 3–4 mph and they could typically travel 20–25 miles a day carrying 160 lb and the saddle. On unsaddling they were allowed to roll, 'a proceeding they thoroughly enjoy'. They were also good swimmers. The mules varied in height from 12 to 17 hands (122–173 cm). Large American and Spanish mules were used as draught or riding animals, but the largest size for packwork was about 14.2 hands (147 cm) and the army used North and South American, Spanish, Italian, Maltese, 'Cyprian', Egyptian, Syrian, Abyssinian, Persian, Chinese, Indian and Cape mules, all of which proved satisfactory. The American army at the time used 'bell' mares for their pack-train mules to follow.

The New Forest in Hampshire became a centre for mule-breeding to meet the demand in America, with the animals being shipped from Southampton. Many a British soldier returned from various wars with such good memories of mules that they encouraged greater use of them on the farms at home, and for a while even after World War II (in which they notably played an important role in Burma, carrying military equipment over difficult terrain) mules did indeed find a role in

agriculture. But they were soon displaced by tractors; and mules are now very rare in Britain.

During the first part of the 20th century there had still been a considerable donkey and mule population in Britain. Then came the internal combustion engine and, very rapidly, working donkeys fell out of favour in much of Britain – so much so that, by about the 1930s, it was claimed that there were only 100 remaining. This figure was careless and arbitrary: the animals were not formally counted and there would have been several times that number as beach donkeys alone, but it was certainly true that most working donkeys had been displaced by motorized vans and tractors and after World War II they were no longer a familiar sight in either urban or rural areas. Then, in the 1960s, a new market suddenly emerged and hundreds of Irish donkeys had to be imported to meet the demand. None were destined to be humble put-upon working animals: they were to be pets, or companions for horses. A donkey breed society was formed, with a stud book; there were donkey classes at horse and agricultural shows; people learnt to drive donkey carts and carriages; and in due course donkeys were also used in a therapeutic role. Eventually the Miniature donkey (*qv*) that was so popular in America began to be imported in growing numbers as well. A few people trained their donkeys for light work but more as a recreation than in the serious and essential roles that donkeys had performed for so many centuries.

Despite such a long history, and despite the huge interest and expertise in creating livestock breeds in the 18th and 19th centuries, Britain has never developed its own donkey breed. Nor does it submit any indication of its donkey and mule statistics to the FAO.

Bulgarian (*Bulgaria*)
As in so many European countries, donkey numbers in Bulgaria have fallen sharply since mechanization in agriculture and transport and the total number of donkeys (35,000) and mules (3000) in 2013 equates with the total number of mules alone in 1961 (35,520) – a year in which there had also been around 257,000 donkeys in Bulgaria. Donkey census figures for many countries are notoriously unreliable, however, and the donkey population of Bulgaria was given as 227,000 in the 2009 *Balkan Breed Atlas* (Kugler, 2009). The local donkey is known as *magare*; a similar word meaning donkey is used in other languages in the region. Most of Bulgaria's donkeys are of the small mixed Balkan type (*qv*) found throughout the country as working animals on farms. The coat colour is grey, brownish-grey or very pale grey (almost white), with dark dorsal and shoulder stripes, and there are also some black or chestnut animals. The head is of medium size with a longish skull and slightly bulging profile, and the average height is 110/100 cm at the withers, though this varies considerably. There are, according to the *Balkan Breed Atlas*, smaller longhaired varieties and larger varieties. In the past there have been references in various European countries to a large or even giant donkey of Bulgarian origin, and there is currently one known in Venezuela as *Búlgaro* that is continually imported from Bulgaria for mule breeding. However, today the large donkeys in Bulgaria are usually the Martina Franca (*qv*) of south-east Italy and the Cyprus (*qv*), both used for mule breeding and for improving the local donkeys.

Burro *see* Mexican Burro
Canary Island *see* Majorero
Caribbean *see* Criollo
Cariovilli *see* Italian
Castelmorone *see* Italian
Castilian *see* Spanish; Zamorano-Leones

Catalan (*NE Spain: Catalonia*)
The Spanish autonomous community of Catalonia borders southern France along the Pyrenees (*see also* Pyrenean). In the past, names for the large local black donkey of Catalonia included *Garañón de Vic* (*garañón* = ass stallion), or *Guarà de Vic*, and *Raza Ausetana* (Ausa was the Roman name for Vic, or Vich, which is in the Osona *comarca* of the province of Barcelona). Well known for its sexual vigour and longevity, the Catalan or Catalonian (*asnal Catalana*, *asinina Catalana* or *ruc Català*) has always been primarily a mule breeder and the emphasis has been on improving and maintaining its size, strength and prowess. Its height is in the range of 145–160/135–150 cm at the withers. The coat is usually short and black, but longer and chestnut-coloured in winter, with white points.

The type was bred in several Pyrenean and pre-Pyrenean regions of Catalonia. There was a stud book, or Registration Book, for the Catalan as early as 1880, which indicates the importance of a breed that was influential in the improvement or creation of several European breeds, including the French Poitou, Italian breeds such as the Pantellaria, Martina-Franca and Sicilian, and the donkeys of Malta and Cyprus, and, most famously, was essential to the formation of the American Mammoth Jackstock (*qv*): the Catalan arrived in Charleston, South Carolina, in 1819 under the name Imported Mammoth and was used extensively in Kentucky, Tennessee and Missouri. The Catalan was also exported, at the end of the 19th century and during the 20th, to Canada, South and Central America (Argentina, Brazil, Cuba, Mexico, etc), Australia, India, Madagascar and several African countries (Algeria, Congo, Madagascar, South Africa, Tunisia, Zaire) and to Germany and the UK.

Yet even the Catalan suffered a substantial drop in numbers at home in the second half of the 20th century, a decline described as 'vertiginous and uninterrupted during this century' (Jordana and Folch, 1996). In the 1920s there had been more than 1 million assorted donkeys countrywide in Spain's official census, but in the two decades between 1960 to 1980, with the rapid increase of mechanization in the countryside, the donkey population would decrease by 73% and mules by 83%. In 1976 there were 253,000 donkeys in Spain as a whole, of which 3700 were in Catalonia along with 15,452 mules (out of 281,000), but in 1984 there were 1550 donkeys and 4069 mules in Catalonia (out of 160,000 and 145,000, respectively) and in 1990 only 415 donkeys and 543 mules (out of 130,000 and 100,000, respectively).

In 1978 the *Asociación para el fomento de la Raza Asinina Catalana* (AFRAC) was established to rescue the breed from extinction by protecting, promoting and improving the remaining population. In 1994 the Catalonian government supported a programme of conservation and maintenance of animal genetic resources in relation to the breed, promoted and financed by the DARP (department of agriculture, livestock

and fishing) in collaboration with AFRAC and with the animal genetics unit of the Veterinary School of Barcelona. At the time there were just over 100 Catalan donkeys, about a third of them male, and the breed was classified as being critically endangered. A decade later the population had doubled and included around 50 sires.

As part of the conservation programme, the morphological characterization of the breed was established and was presented by Jordana and Folch (1996). Individuals of the breed are 'of longilinear appearance, hypermetric format and concaviline profile, this concavity being slightly more apparent in jennies and foals than in stallions. They are animals of large size, 140 cm at the withers on average, with a weight ranging between 350 to 450 kg. They have robust extremities with long, thick bones, acquiring large proportions within a harmonic group. They are slender, with a straight neck and rounded thorax. Not a running animal, this breed is very effective at hard work where great strength and vigour are needed. The black coat color is considered characteristic, although this could be influenced by several environmental factors, as well as nutritional state, season of the year, sun incidence and hair length. The belly and internal face of the extremities show whitish fadings. The muzzle and orbital zone of the eyes also show these silver fadings. A very characteristic reddish fringe, between silver and blackish colors, can be seen above all in the zones of the head. The skin of these animals could be classified as hypermetabolic type, relatively fine but profuse in growth. It possesses scanty subcutaneous conjunctive tissue in relation with the horse. The foals have fine, long and slightly ruffled hair. As the animals grow, they lose this fluff, changing to straight, fine and short hair. The mane in both sexes is dark, short and not very thick.'

The description also stated that they are animals of 'sanguine temperament although they are accustomed to being quite peaceful' and that in general they are 'very noble and of rapid reactions'. The head is 'wide and weighty', the eyes are large, lively and very expressive, the muzzle is wide and pronounced 'with a tendency to acromegaly and with bounded fading. The nasal bones expand at their base, but halfway down the nose they narrow in order to enlarge again at the end, where they contact with the muzzle, giving a very pronounced configuration of the supranasals'. The ears are long, straight and narrow and 'due to their potent muscular insertion' they remain erect and are very mobile and expressive. The very muscular neck is long, wide, straight and flexible; the back is straight and long and the body gives the 'sensation of being almost cylindrical'. The legs are robust and muscular and the hoofs slightly narrow.

Despite the decline of the mule, Jordana and Folch (1996) felt that there was still a good economic role for the Catalan donkey (and its mule) in the tropics and in some developing countries where donkeys were more important than horses, especially in the exploitation of inaccessible forests. It could still help to improve other donkey populations worldwide through the export of jacks or frozen semen. In Europe there might be prospects for the development of an albeit limited market for donkey's milk, but the main future for donkeys as a whole, including the Catalan, would appear to be in association with recreational tourism in mountain zones and as a companion animal – which continues to be the role for the iconic Catalan donkey. Recently it has also become a defiant satirical symbol for Catalonian nationalists, in opposition to the ubiquitous Spanish bull, or *Toro de Osborne* (originally an advertising symbol for a brandy company).

The **Berga** is a former variety of the Catalan.

Caucasian (*Armenia, Azerbaijan, Georgia and Dagestan*)
The mountain ranges of the Caucasus, sandwiched between the Black Sea and the Caspian Sea, separate Europe from Asia. The Caucasian (*Kavkazskaya* in Russian) or *Transcaucasian* is a small indigenous type of donkey that includes those of Armenia, Azerbaijan, Dagestan (Russia) and Georgia. The **Georgian** (*Gruzinskaya* in Russian) has several regional names, including *Abkhasian* in the northwest, *Kakhetian* in the east and *Meskhet-Javakhet* in the south-west. Most of the Caucasian donkeys are grey or mouse-coloured, often with a shoulder cross, and they are generally grouped with the Central Asian (*qv*). Both groups are described as small (in the range of 80–110 cm at the withers), with a long narrow coarse head, very prominent forehead, slightly dished face, short straight neck, shallow chest, heavily muscled loins and strong hoofs. There is little to differentiate them except their size. In the Caucasian group, the smallest is the Meskhet-Javakhet (about 92 cm), followed by the Kakhetian (94 cm), Armenian (96 cm), Azerbaijan and Dagestan (97 cm) and Abkhasian (98 cm).

During the time of the USSR, there had been 850,000 donkeys and 10,000 mules throughout the Caucasian and Central Asian republics in 1940 but by 1984 these populations had been reduced to 342,300 donkeys and 1900 mules. In that year, there were nearly 33,000 donkeys in Azerbaijan, 26,000 in the Russian Federation, 8000 in Georgia and 5300 in Armenia. In Central Asian republics the numbers were 138,000 in Uzbekistan, 67,500 in Tajikistan, nearly 34,000 in Turkmenistan, 17,600 in Kazakhstan and more than 13,000 in Kirgizia. The highest proportions of mules (500) were in Azerbaijan and in Tajikistan, with 400 in Armenia and 300 in Russia. Since then some of the numbers have increased, others have decreased (*see* Table 1).

Central Asian (*Afghanistan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan*)
Found to the east of the Caspian Sea, the indigenous Central Asian donkeys are often grouped with the similar Caucasian (*qv*), though a little larger. It is said that donkeys were brought into Central Asia with the arrival of a property-owning ethnic group from the Iranian plateau, not later than the middle of the 2nd millennium BC, and they became of considerable economic importance in the ancient valley oases of the Tejen and Murgab. In the early period of the 1st millennium AD, records show that donkeys formed more than 9% of the domestic animals in the Amu Darya delta (now Kara-Kalpakis) of North Khorezm (the Khorezm region, on the borders of Uzbekistan, Kazakhstan and Turkmenistan, lies between the Aral Sea and the Karakum desert), but by the 14th century small cattle had become increasingly important and the proportion of donkeys dropped to 6.7%. In South Khorezm there was also a steady decrease in donkey numbers over the centuries, but throughout the region the type of donkey changed very little, if at all, in terms of its size.

The Central Asian donkeys are named nationally as the *Kazakh*, *Kirgiz* (or Kyrgyz), *Tajik*, *Turkmen* and *Uzbek*. They are of various colours, mostly grey (often with dorsal and

shoulder stripes) but also white, mouse-coloured and black, and occasionally they have leg stripes. The smallest is the Kirgiz (99 cm), followed by the Tajik (100 cm) and Uzbek (102 cm). The largest in Uzbekistan, where donkeys in general are valued as draught animals able to tolerate a hot climate and meagre feeding, is the **Kara-Kalpack** (104 cm), named for the extensive autonomous region of western Uzbekistan. This area of formerly irrigated and productive desert has now become prone to severe drought and temperature extremes since the effects of climate change and the rapid evaporation of the Aral Sea. It is said that the Kara-Kalpack normally takes a load of 100–300 kg but can pull a cartload weighing 1.5–2 t; in one test the maximum pulled by the largest animal (110 cm) was 2532 kg. Largest of all the region's donkeys, however, is Turkmenistan's Mary (*qv*).

Afghanistan's donkeys remain essential to their region and are nearly 2.5 times more numerous here than in the rest of the Central Asian countries combined. Afghanistan had 1.44 million donkeys and 21,000 mules in 2013, almost the same as the populations in 1961 (*see* Table 1). They are the primary means of transportation in the countryside (along with bicycles) and are sometimes described as the 'Jeeps' of Afghanistan – or even as the country's 'helicopters': donkey numbers rose steadily when the USA began to withdraw its helicopters and the animals stepped in to transport everything from rice to ammunition to Afghan security forces. It has been said recently that without donkeys there would be no Afghan army, and some of the UN international security forces also discovered the usefulness of these humble animals. The Americans used pack donkeys to carry supplies in the mountains into places that were inaccessible for wheeled vehicles and used mules as their main mode of battlefield movement on difficult terrain at night to infiltrate valleys. The Canadians formed a donkey brigade to deliver critical supplies in difficult terrain. Donkeys have played a vital role in the mountain areas during endless years of strife in this war-torn region, especially in its extensive mountainous areas. In 2014 a charity even set up 'donkey ambulances' with inflatable saddles designed to carry pregnant women safely and comfortably to health centres.

Throughout its history, because of its location, Afghanistan has been an arena for the interaction of civilizations from the east, the west and the north, whether in settlement, trade, culture, religion, colonization or conflict. It is possible that donkeys were first introduced here by the Iranians (Aryans) and Persians, or perhaps in the other direction from the Indus Valley; but there does not seem to have been any research into the origins of Afghan donkeys and only recently has there been any interest in the country's possible breeds. In the markets, there might perhaps be a higher value on the donkeys of Qataghan (Kataghan, in the north near Tajikistan border) for their size and endurance, or the very large Turkmen donkeys (said to be the size of a small pony) that carry large loads at a quick walking pace, but on the whole donkeys are just donkeys or, in the local language, *khar*. However, a study of donkeys in north-eastern Balochistan (a desert and mountainous region covering parts of south-west Pakistan, south-east Iran and south-west Afghanistan), Pakhtoonkhua (Pakhtunkhwa, on the Afghan/Pakistan border adjacent to the Khyber Pass) and southern Afghanistan found two breeds: the Shinghari and the Sperki, named for local tribes (Raziq, 2012).

The **Shingari** is in southern Afghanistan and the adjoining area of Kakar Khurasan; there are larger breeding herds in the Suleiman mountains of north-eastern Balochistan. The Shingari is used by Afghan nomads for seasonal pastoral migration between central and southern Afghanistan's mountains and Balochistan and the Indus plains. It is a relatively large donkey, capable of carrying a load of up to 240 kg on its back on the plains, or 160 kg in the mountains. It is mainly a pack animal and is also used increasingly by the chromite mining industry as well as by nomads and pastoralists, though its role as a cart-puller in the cities has decreased since the introduction of Chinese rickshaws. There are many coat colours in the Shingari but the most dominant and selected colour is white. It is very well adapted to mountainous terrain, highly resistant to disease, able to walk long distances during the migrations and has the interesting habit of drinking water with closed jaws, avoiding the risk of leech infestation. There are about 1.2 million Shingari donkeys and the population is increasing.

The **Sperki** is mainly used by semi-nomadic and sedentary pastoralists for light work, carting and the transportation of water. It is found mostly in the Suleiman mountain region, especially the Kohlu district, and is quite different to the Shingari. The Sperki is small, wild in nature and not easy to handle. It also has a high libido and is more than willing to mate with Shinghari females, offering something of a threat to the purity of the latter breed. The Sperki can carry a load of up to 160 kg on its back on the plains and 60–80 kg in the mountains; it is also used for light agricultural work, or to pull light carts in the cities and also carries nomadic children. It is very hardy and highly disease resistant, capable of looking after itself and has the ability to run at speed: it can fetch a high price for cart-racing in the Punjab and Sind. The population of the Sperki is around 0.5 million.

Chad *see* Sudano-Sahelian
Chigetai *see* Asiatic wild ass

Chinese (*China*)
There are about 6.4 million donkeys and 2.5 million mules in China – almost the world's highest populations (according to FAO statistics), yet the FAO Animal Production & Health Paper no. 46 on *Livestock breeds of China*, published in 1984, completely ignored the species except to mention that numbers had increased from 7.748 million and 4.166 million, respectively, in 1980 to 8.999 million and 4.464 million, respectively, in 1982, that they were all draught animals, and that they were distributed in North China (including Inner Mongolia) and North-west China. The combined number of asses and mules equalled the number of horses (though the latter were declining) and hugely outnumbered the camel population (about 600,000), but although horse breeds and camel breeds and their uses and productivity were described in detail, there was no information at all about donkey breeds. In 1986 donkeys were included in *Horse and Ass Breeds in China*, part of a series of breed publications sponsored by the Chinese Academy of Agricultural Sciences (but not translated into English). The ten breeds were Guanzhong, Dezhou, South Shanxi, Guangling, Jiami, Miyang, Qingyang, Xinjiang, North China and South-west China.

Since then, details of 21 native donkey breeds have been given in full in the *Report on the Domestic Animal Genetic Resources*

in China compiled for the FAO in 2003. The report stated that only one donkey breed, the Aba (*see* South-west China), was classified as endangered. The country's 'famous' donkey breeds included Guanzhong, Dezhou and Jiami. The Guanzhong donkey was the only breed among 78 livestock breeds to be selected as a key conservation breed at state level in 2000.

Chinese donkeys have been broadly subdivided by size. The large breeds include Dezhou, Guanglin, Guanzhong and South Shanxi; the intermediate are Jiama, Miyang and Qingyang; and the small include Linxian, North China, Southwest China and Xinjiang. Donkeys are found in all regions other than North-east and South Central (except for Henan). In North-west and South-west China the breeds are the Tibetan, Xinjiang, Qinghai, Yunnan and, in Gansu, the Liangzhou and Qingyang, and in Shaanxi the Guanzhong, Jiami and Shanbei. In North China are the Kulun of Inner Mongolia, the Yangyuan of Hebei and the Guanling, Jinnan and Linxian of Shanxi. The East China breeds include Dezhou, Subei, Huaibei, Miyang and Taihang. Population figures, albeit long out of date (ca. 1981), show that the most numerous are the North China (3 million) and the Liangzhou, Xinjiang and Taihang (each over 1 million); and the least numerous are the Linxian (4227) and Qingyang (3900). There are separate entries for: Dezhou; Guangling; Guanzhong; Huaibei; Jiami; Jinnan; Kulun; Liangzhou; Linxian; Miyang; North China; Qinghai; Qingyang; Shanbei; Southwest China; Subei; Taihang; Tibetan; Xinjiang; Yangyuan; and Yunnan.

Cordoba *see* Andalusian

Corsican (*France: Corsica*)
It is believed that donkeys have been present on Corsica since Babylonian times. Traditionally they were used by shepherds to carry water, and as pack animals at the grape and olive harvests, and also for meat (including sausages). There are perhaps a thousand donkeys on the island now, a sharp drop from about 20,000 in the 1930s, and they are mainly used as pack animals for the tourist industry. There is as yet no recognized Corsican breed but there are two types: the smaller original grey (average height 98 cm) and a larger crossbred black from deliberate breeding of the older type with Catalan donkeys to increase the height to 120–130 cm. There is a conservation programme for the original type; and an association known as *A Runcata* (*runcà* means 'bray' in Corsican) has been trying for some years to gain recognition of the Corsican donkey (*sumeru*) and its mule (*mulu*).

Cotentin (*N France: Manche*)
The Cotentin peninsula forms the northern part of the Manche department in Normandy. One of France's endangered breeds, with a population in 2004 of 405, the Cotentin donkey centred around St Lo in the Manche was officially recognized as a breed in 1997. A conservation programme has ensured a gentle increase in numbers, so that by 2013 there were about 800 recognized purebred Cotentin; there are up to 200 new registrations annually in the stud book.

It is claimed that donkeys were already present in the Manche in the mid-16th century, and possibly even five centuries earlier, as there are place-names such as Asnières en Bessin and Asnelles in the region dating back to the mid-11th century. In 1902 there had been about 4000 donkeys in the Manche and in the 1930s they had numbered around 9000, but had dwindled rapidly with increasing agricultural and transport mechanization. They had been farm pack-animals, often transporting milk-cans in panniers slung across their backs, and along the coasts they had traditionally been used to haul cartfuls of seaweed for use as field fertilizer. They were also used to transport dockside goods in ports such as Cherbourg.

Their calm and docile temperament ensures that they continue to have a role in the leisure industry, pulling carts or accompanying trekking tourists to carry their backpacks, or simply as pets or for use in what the French call *asinothérapie*. They are of modest size (120–135/115–130 cm in height) but strong in the neck, back and legs. The coat is dove grey, sometimes tinted with ash-grey or blue-grey and with white to grey points and a well marked cross. There may or may not be leg stripes and a russet tinge on the face.

Several hundred Cotentin donkeys were exported to other French regions between the two world wars and it is also claimed that some found their way to the **Galapagos Islands**. In the 18th century a ship out of St Malo sailing to the Americas ran aground during a storm in the archipelago and its consignment of donkeys acquired at the Lessay fair in north Cotentin landed on the islands. In recent years there have been concerted efforts to eradicate herds of feral donkeys (and feral goats and pigs) from some of the Galapagos islands, though these were more likely to have originated from deliberate introductions of donkeys from various countries during the early 19th century.

Criollo (*Latin America and Caribbean*)
The term criollo (or *crioulo* or *créole*) is applied to humans and livestock born locally and well adapted to local conditions but whose ancestors, however distant, were European. Apart from Brazil (*see* Brazilian), none of the countries in this large region has specific donkey breeds, though several use variants of the term burro as well as criollo for their local donkeys, or simply the local word for donkey, such as *asno*. Among those who contribute to the DAD-IS database, for example, Chile gives *Asno* as a locally adapted donkey, Cuba's *Asnal Criollo* is the locally adapted donkey, El Salvador lists a *Burro Criollo* pack and baggage donkey, Guyana simply refers to the *Creole*, Haiti has its *Bourik* (burro) or *Creole*, Mexico its *Burro* (*see* Mexican burro), Nicaragua's *Burro* is for riding and work in rural areas, Peru's *Criollo* is a draught animal in rural areas, Suriname names a '*Grey ass*' as an imported exotic draught animal in the plantations, and in Guadeloupe the criollo is known as *Caribbean*. The *Burro Kentucky* imported by several Latin American countries is the American Mammoth Jackstock, used for mule production; likewise the *Americano* in Cuba.

Venezuela, although it has no donkey breed societies, lists six 'breeds': the *Asno Criollo* (locally adapted pack/baggage donkey, descended from breeds introduced by the Spaniards and used in subsistence systems for carrying and pulling loads and for riding); the *Brasil* (recently imported exotic for mule production); the *Búlgaro* (continually imported from Bulgaria for mule production); the *Jack Norteamericano* (American Mammoth Jackstock, continually imported from the USA for mule production); the *Mula* (locally adapted all-purpose riding mule of Spanish origin for riding, load-bearing, traction and tourism); and the *Peruano* (*qv*, imported from Peru as a 'fancy'

donkey for exhibitions and parades). Venezuela's populations have remained at a fairly steady level around 400,000–440,000 donkeys and 72,000–78,000 mules over the past half a century, though it is claimed in the country's 2004 report to the FAO on its animal genetic resources that the raising of donkeys and mules is almost non-existent. The history of Venezuela's donkeys is unrecorded but it can be assumed that they came into the country with Spanish colonists. Donkeys (*asnales*) and mules (*mulares*) became important for the transport of merchandise throughout the country, but were quickly replaced by motorized transport during the 20th century.

Croatian (*Croatia*)
There are perhaps 4000 donkeys in Croatia, 60% of them used as draught animals (but they are far outnumbered by horses in this role) and the rest mainly for recreational purposes, though there is also some production of donkey meat and a potential milk market is being investigated. In Zagreb, the Croatian Livestock Centre has been investigating the genetic diversity and potential of the country's indigenous donkeys for several years.

The local word for donkey is *magarac* and Croatia's donkeys are largely of the Balkan type (*qv*) but there are three better characterized and recognized regional breeds, two of which are critically at risk.

The **Istrian** donkey (*Istarski magarac* or *Istarski tovar*, meaning pack donkey) in the extreme north-west is the largest type and is thought to have originated from the Apulian of Italy (*see* Martina Franca). Its average heights are 125/122 cm, weights 250/220 kg and it is known for its endurance, resistance and longevity. It is used as a strong-legged draught, riding or driving animal (a traditional role was to transport water or market goods such as vegetables) and in mule production and as a tourist attraction; and has also been exploited for its milk and meat, including sausages. The coat is black with a pale muzzle and there is a short black bristly mane. There were just over 100 breeding Istrian donkeys in 2005 and there is a stud book and a conservation programme for this critically endangered breed.

Croatia's **North Adriatic** donkey (*Sjeverno-jadranski magarac*) is particularly well adapted to the Kvarner Gulf islands (it is sometimes known as *Kvarnerski magarac*) and is of medium size (average height 115.5 cm, weight 175 kg). The coat colour varies from brown to black, and dorsal or shoulder stripes may or may not be expressed or clearly discernible. The head has a straight profile; the legs are sturdy and strong. Uses include draught power, riding, driving, mule production, tourist attraction and hobby animals. The North Adriatic is also critically endangered, with a total breeding population of only five males and 150 females in 2005. There is a stud book and a conservation programme. Genetic research has shown that the Istrian and North Adriatic are closely related (e.g. Ivankovic *et al*., 2002).

The most numerous of Croatia's three endangered breeds is the **Littoral-Dinaric** (*Primorsko-dinarski magarac*, sometimes known as *Dalmatinski magarac*) and it is among the smallest donkeys in the world (average 96 cm, 90 kg). It is found along Croatia's karst coast (hence 'Littoral') and the small hard hoofs are well adapted to rocky ground. Most of these compact little donkeys are in the Dinaric Alps villages of Dalmatian Zagora and they are used as draught, riding and driving animals and as a tourist attraction. There is a programme to investigate their potential as milk producers in extensive production schemes for niche markets, though yields are modest (Ivanković *et al*., 2009; Ramljak *et al*., 2012). The coat colour is grey to dark grey with light to white points and with dark dorsal and shoulder stripes. There is a conservation programme for the breed (*see* Balkan), though its numbers are considerably higher than the Istrian and North Adriatic

Cyprus (*Cyprus, Greece*)
The large Cyprus donkey (*Kypriakòs ghàdharos*) is found on mainland Greece as well as in Cyprus itself. Although it is widely distributed and deemed to be one of the better donkey breeds of the Middle East, it is considered to be endangered. It is a large donkey: the height at the withers is in the region of 125–132/120–125 cm, weight 300/250 kg, and it is often used for mule production. The colour of the short coat is dark brown to black with pale points. It has a large head with convex forehead and straight profile, and it has strong feet. The Cyprus is well proportioned, well adapted to heat and drought and described as quiet and frugal. It possibly originated from indigenous small grey Greek (*qv*) donkeys crossed with large Catalan (*qv*) types imported from south-west France during the time of the Crusades.

Numbers of donkeys in Cyprus have dropped sharply: in 1961, according to FAO statistics, there were about 48,000 donkeys and mules; in 2013 there were only 5200 (*see* Table 1). In 2002 there were said to be 2175 donkeys in Greek Cypriot areas, most of them working in rural districts. The Cyprus is also found in Serbia and as the Qubressy or Al-Salibi in Jordan (*see* Jordanian). In Turkish Cyprus there are several hundred feral donkeys in the Karpas peninsula.

Dagestan *see* Caucasian
Damascus *see* Syrian
Danish *see* European

Dezhou (*E China: N Shandong*)
A tall well built donkey (average height 136/130 cm), the Dezhou is found on the Lubei Plain (Shandong province) and Jidong Plain (Hebei province). It is one of the best known of China's donkey breeds. Its typical carrying capacity is 750 kg and the maximum draught power is 78% of its bodyweight. There are two colour varieties: the **Sanfen** is black with white points and the **Wutou** is black all over.

Dinaric *see* Croatian
Dogon *see* Sudano-Sahelian
Domaci balkanski magarac: *see* Balkan
Dongolawi *see* Ethiopian; Sudanese
Duni *see* Nigerian

Egyptian (*Egypt*)
Egypt is the likely cradle in which the African wild ass was first domesticated some 6000 years ago, and in ancient times it became the region's most important animal. There were herds that numbered up to a thousand animals each. Portrayals of donkeys usually showed a grey animal with a shoulder cross; and pack donkeys were essential to the huge trading caravans that travelled between Egypt and Nubia. Donkeys were also important to sedentary farmers, not just to carry goods but also

for threshing, grinding flour and 'treading' newly sown seed into the ground. However, later in ancient Egypt the wild ass was seen as the embodiment of Seth, god of storms, the desert and evil, and perhaps the reputation of the donkey never really recovered from this negative association with its ancestor.

By the 18th and 19th centuries, Egypt's asses were described as the finest in the world, esteemed for their vigour and beauty, and would sometimes fetch higher prices than horses; they were hardier and easier to feed, and so were preferred for desert transit. The most handsome asses were seen in Cairo but had been brought in from Upper Egypt and Nubia. 'In ascending the Nile, the influence of climate is perceptible in these animals, which are most beautiful in the Said, but are in every respect inferior towards the Delta' (Loudon, 1825). Egypt was also said to have the world's finest mules at the time.

Today donkeys are present in increasingly large numbers: the total Egyptian population in 2013 was 3,356,000, which is more than twice as many as in 1961 (*see* Table 1). They are used solely for transport and riding. Most smallholders and subsistence farmers have one or two donkeys for carrying loads and for riding in the villages and the animals have a significant role in agriculture; yet no attention has been paid to their care and development, nor to any breed characterization.

Just four types are recognized. A 'locally adapted' type is the **Masri** – a name that simply means Egyptian (*Masr* is the native name for Egypt). Most of the country's donkeys are simply **Baladi** (the Arabic word for native), described vaguely as a variety of the Egyptian found in Lower Egypt (i.e. in the north). In Upper Egypt another variety of the Egyptian is the locally adapted **Saidi**, or *Saiedi* (the word *sa'ayda* sometimes refers to people in the south) found on newly reclaimed land and in the desert. Perhaps the most interesting is the Egyptian White or **Hassawi** riding donkey, again said to be a variety of the Egyptian but now used more in leisure than for work. In fact, the Hassawi appears be Saudi Arabian, not Egyptian: it originated, as the name implies, in al-Ahsa, in eastern Saudi Arabia (Al-Busadah and Homeida, 2005). Al-Ahsa (pronounced locally as al-Hasa) is a productive agricultural region famous for its dates and for its white donkeys; and local villagers sometimes decorate their white donkeys with henna. The Hassawi donkey is comparatively large, sometimes reaching up to 130 cm at the shoulder, and is ridden or sometimes used to pull carts. In Saudi Arabia it is often fed mainly on the local dates. In several countries there are claims that local white donkeys must have descended from the Egyptian, with no real evidence of such a lineage.

Ellinikon *see* Greek
Emiliano *see* Italian
Encartaciones *see* Las Encartaciones

English/Irish (*Australia, New Zealand*)
This is the name given to small donkeys originally imported from England and Ireland in recent decades into Australia and New Zealand. In the latter, they have been developed into a miniature type (under 10.2 hands, i.e. 107 cm) that is bred in a variety of colours. In Australia they are described as small, compact, strong and sturdy, very active and willing, with an excellent temperament; they are kept as pets, children's mounts and harness animals. The English Donkey Society of Australia was founded in 1976 to register purebred donkeys imported from England, Ireland and New Zealand, or their first-generation progeny. They are now registered with the Donkey All Breeds Society of Australia (DABSA).

Eritrean *see* Ethiopian
Etbai *see* Sudanese

Ethiopian (*Ethiopia*)
The ancient word for donkey in Ethiopia is *harre*. More than 5000 years ago very large caravans, including domestic pack donkeys, are known to have travelled from Egypt into Ethiopia. The wild ancestor of the donkey was the African wild ass (*qv*), *Equus africanus*, remnants of which are still found on the borders of Ethiopia, Eritrea, Somalia and Sudan.

Ethiopia has the largest population of donkeys in the world: the FAO statistics for 2013 give a figure of 7 million donkeys (compared with 6.36 million in China) and there are also 345,000 mules in the country. In contrast to the worldwide decline in donkey numbers, the population in Ethiopia increased steadily during the latter half of the 20th century. In 1961 the FAO had estimated that there were about 3.7 million donkeys in Ethiopia and in 1995 it was about 5.2 million. One-third of all of Africa's donkeys and two-thirds of Africa's mules are in Ethiopia.

Famously, there is an Ethiopian saying that a farmer without a donkey is a donkey himself. Most rural households have at least one donkey to carry firewood and water. The donkey remains the backbone of rural transport in Ethiopia and this reflects the reality of life in a harsh environment where, in a land that has had too much war and famine, the donkey is often the only beast of burden tough enough to survive under the workload that it is given. Most of the country's human population are subsistence farmers, relying on meagre surplus produce as income to buy essentials, and the majority live many miles from the road network: only the donkey can transport them over the rough terrain of the highlands to and from the markets. They also rely on donkeys for ploughing small plots on marginal land and harvesting the crops, and in the direst of circumstances it is the donkey that transports the migrating household to a better place. It is also the donkey that distributes food aid to areas beyond the reach of trucks during major famines. Although people value their donkeys and rely heavily upon them, there are inevitable problems with the animals' welfare and health; and the Donkey Sanctuary, a British charity, still treats around 400,000 donkeys a year in clinics scattered about the country.

The names of different regions in Ethiopia can cause confusion. Between 1942 and 1995, the country was divided into 13 provinces (there had been considerably more before that period). In 1995, however, nine ethnic regional states and two chartered cities (Addis Ababa and Dire Dawa) replaced the older province system and with very different boundaries. These ethnic states, known as regions rather than provinces, include Tigray and Afar bordering Eritrea in the north; Amhara, Benishangul-Gumaz, Gambela and Southern Nations bordering Sudan in the west; Somali region bordering Somalia in the south-east; and the sprawling central region of Oromia that extends to share its southernmost border with Kenya. These new regional names (along with variations in spelling)

need to be borne in mind when discussing the local names of various donkey types in Ethiopia.

In 1993, by zone, the densest donkey population in Ethiopia was in Tigray in the north (468,000 donkeys, density 24.6/km^2), followed by Arsi (363,000, 14.7%) and Shewa (959,000, 21.2%) in central Ethiopia; Shewa had the highest population of all the zones (Admassie *et al*., 1993).

There are four named types of donkey in Ethiopia, based on average size and coat colour: the Abyssinian, Jimma, Ogaden and Sennar (Dreyfus, 1974). Government census figures in 2003, describing each of the four major types as being 'transport & trade pack' animals, gave populations of 213,000 for the Ogaden type in the Somali region and 9576 in Dire Dawa; 139,400 of the Jimma type in the Oromia region (in the old provinces of Illubaber, Kaffa and Wellega); and 20,702 of the Sennar in Benishangul; but there are no data for the most common and widespread of Ethiopia's donkey types: the Abyssinian (Tadesse *et al*., 2003).

Kefena *et al*. (2011) carried out a nationwide survey in order to record morphological characteristics of different types of donkey in Ethiopia, with a particular interest in eco-geographical structuring of the various populations. They identified six populations or breeds: Abyssinian, Afar, Hararghe, Ogaden, Omo/Hamer and Sinnar.

The first four types are described in several sources following Dreyfus (1976). The **Abyssinian**, also known as the *Ethiopian*, is similar to the Sudanese Pack (*see* Sudanese) and usually slate grey (occasionally chestnut brown) and small, standing at 86–102 cm at the withers (average 94/94 cm). It is described by Kefena *et al*. (2011) as predominantly brown and hairy, dwarf, and typically compact, hardy and 'heavily working', and its distribution follows the mountain chains on both sides of the Great Rift Valley. The **Jimma**, 95–100 cm, is grey and has a large head and short ears. Jimma is a market city (formerly in Kaffa province) and a 'special zone' in Oromia region. The **Ogaden** averages 103 cm, is heavy in the bone and has multiple leg stripes; the Kefena report describes it as mainly grey or greyish-red, leg stripes not uncommon, heavily built, and says that is found on the Somali/Ogaden plain and is widely distributed in all pastoral and agropastoral regions in Somali region. The **Sennar** is the largest and most improved type at 110–114 cm and with a better conformation than other Ethiopian donkeys; its transboundary name is *Dongolawi* and it is a variety or synonym of the Sudanese Riding donkey (*see* Sudanese). The Sennar, which may be black, dark brown or reddish grey, or occasionally pale grey to white, is used mainly in mule production. Sennar, now the name of a Sudanese state and town on the Blue Nile, was an old sultanate (at its peak in the late 16th century) that was constantly fighting neighbouring Ethiopia and it was noted by a German traveller in 1700–1702 that many caravans, including donkeys, were trading at that time between Sennar and Ethiopia. Kefena *et al*. described the 'Sinnar' as tall with variable coat colours and added that 'white and leopard coat colors are common. Leopard coat colored donkeys have ridge on their ribs' (the description 'leopard coat' is not explained); they are 'heavily working' animals in the north-western lowlands along the border with Sudan, from Humera in the north-west to Assosa in the west, but rare or absent beyond.

The other types in Kefena *et al*. (2011) include the donkeys of **Afar** (sampled in the south of this regional state and found on the Afar plains, interfacing with the Somali wild ass), which are grey, greyish-red and light rose, commonly with leg stripes; they are free-ranging and 'have no or less work loads'. The **Hararghe** donkeys in the Oromia/Hararghe highlands of eastern Ethiopia usually have grey or brown coats, often have leg stripes and are 'heavily working' animals. The **Omo/Hamer** donkeys, found in south Omo pastoral lowlands around Lake Turkana and Hammer, Gnyangatom and Dasenech districts in southern Ethiopia and sampled by Kefena *et al*. close to the Kenyan border, are very common around Chew Bahir (meaning salty lake). They have a light grey shiny coat, with a 'rosy' coat colour on the head, and are described as 'fatty' and heavily built free-ranging animals with 'no or less' workloads. They used to be a source of meat for some tribal groups in the past and are still occasionally used as food today.

There are also two mule 'breeds' in Ethiopia: the **Sennar** mule found in all regions, and the **Wollo** mule in the Amhara region, both used for transport. The historical province of Wollo in north-east Ethiopia is now divided between the regions of Afar, Tigray and Amhara. In 2003 it was estimated that there were 8900 mules in Amhara and more than 1.4 million donkeys, claimed at the time to represent about 56% of the country's total population of donkeys, which was estimated as 3.5 million, a little lower than FAO statistics of 3.8 million for 2003, and 1 million mules, which is considerably higher than the FAO figure of 250,000 for that year. In the early 19th century several writers referred to the 'wild mule' of southern Abyssinia, but others called this by its local name, *zecora*, i.e. zebra.

There are no FAO statistics for donkeys or mules in Eritrea but the country's DAD-IS return lists a single donkey breed: the **Kassala**, which is the same as Ethiopia's Sennar or Dongolawi, i.e. Sudanese Riding donkey (*see* Sudanese), and is named for the eastern Sudan state of Kassala or its capital city on the Eritrean border, home to large numbers of refugees from both sides of the border and from Ethiopia. The Kassala donkey is found mainly in north-west Eritrea. For other Eritrean types, *see* Sudanese.

European

Much of Europe has not been the natural home of the donkey, though there have in the past been surprisingly high populations in some unlikely countries with environments that are far removed from the hot dry natural habitat of the wild ass. The most important countries for donkeys are in southern Europe (Portugal, Spain, Italy and Greece) and parts of eastern Europe, especially the Balkan peninsula (*qv*). The least hospitable regions for donkeys are in northern Europe (defined here as the Nordic and Baltic states).

In western Europe the greatest development of donkey breeds has been in France (*see* French), but the 'common donkey' is also found in several other countries in this region, though very few of these countries submit any population data to FAO and it is difficult to determine the true numbers in each country. Belgium's 'breeds' include the *Belgische Ezel* (i.e. **Belgian** donkey) and *Waalse Ezel* (i.e. **Walloon** donkey); the former is claimed to be not at risk, with a total of nearly 3000 (though the FAO statistics give Belgium's total donkey

population as just 2) and there is a stud book; the latter is described as of a height range of 105–120/100–115 cm, with colours including black, bay or grey, with or without a dorsal stripe, and is considered to be endangered, but there seems to be very little to differentiate either of these Belgian 'breeds' from the common European donkey. In the Netherlands the word for donkey is *ezel*. In Germany there is the Thuringian Forest (*qv*), though again Germany submits no statistics to the FAO for its donkeys.

In Denmark there is a countrywide donkey association, Aeselforeningen, but the **Danish** donkey is undifferentiated: it is described as having an average height of 100–110 cm, and can be of almost any colour. It has been estimated that there are around 5000 donkeys in Denmark though the basis of this estimate is uncertain and no statistics for Denmark's donkeys are submitted to FAO. The **Swedish** donkey, or *Svensk husasna*, is again of no particular type but there is a stud book, which contained 404 registrations in 2002.

The countries of the UK (*see* British) and Ireland (*see* Irish) have never claimed to have their own formal breeds, though there are 'English' donkeys in Australia and New Zealand, or, rather, 'English/Irish' donkeys (*qv*), which are described as miniature (*see* Australian Teamster). The Irish donkey (*qv*) is historically reported in some countries as piebald, though this colouring is not unique to Irish donkeys.

Fari *see* Nigerian

French (*France*)
At the start of the 20th century there were probably 400,000 donkeys in France. In 1961 there were 76,200 donkeys and 67,300 mules. In 2013 the donkey population was down to 15,000, plus about 31,000 mules.

In recent years there has been a growing interest in French donkey breeds and steps have been taken by the government and by the national stud (*Haras Nationaux*) to rediscover, characterize, recognize and conserve them. The seven French regional breeds that are now recognized are Berry Black (*âne grand noir du Berry*), Bourbonnais, Cotentin, Normand, Provence, Pyrenean (*âne des Pyrénées*) and the famous but critically endangered Poitou (*baudet de Poitou*). There are separate entries for each of these breeds. There is also an entry for the unrecognized Corsican.

Gaidaros *see* Greek
Gascogne *see* Pyrenean
Georgian *see* Caucasian
Ghor-khar *see* Asiatic wild ass
Gourma *see* Sudano-Sahelian
Graciosa Dwarf *see* Miranda

Greek (*Greece*)
Greece, a mainly mountainous Mediterranean country with hot dry summers and mild winters, is well suited to donkeys and mules and they have been essential there as transport, pack and draught animals since ancient times. They used to be widespread and numerous but, as in other parts of Europe, population levels fell dramatically in the post-war decades (*see* Table 1). In 1961, according to FAO statistics, there were 506,000 donkeys and 222,000 mules in Greece. By 2013, there were only 43,000 donkeys and 22,000 mules.

Giorgos Arsenos, assistant professor at the Aristotle University's School of Veterinary Medicine, claimed at a donkey and mule conference on Hydra in 2007 that the donkey population had dropped from nearly half a million in the 1950s to just over 18,000 in 1996 and that the fires that were then sweeping the southern Peloponnese (home to 40% of Greece's donkeys) might reduce the population even further, to the point where he suggested that it would fall to below 1000 donkeys throughout the country by, say, 2020. At the time, 10% of Greece's donkeys were on the small rocky hilly island of Hydra, mainly because motorized vehicles are banned from this popular tourist destination and so donkeys and mules are used for transport.

However, donkey population statistics have always been unreliable in Greece. Arsenos *et al*. (2010) suggested that the FAO statistic of 40,000 donkeys and 20,000 mules (recorded each year from 2007 to 2012) was wildly at odds with data obtained from individual Greek prefectures and the Hellenic Ministry of Rural Development and Food which, in 2008, gave a total of about 13,000 mules and only 14,750 donkeys in the whole of Greece, the largest proportion of which was in the Peloponnesus area (4436). Whatever the true numbers, it is very clear that the donkey and mule populations in Greece are decreasing at an alarming rate and their protection and conservation should be a priority.

The role of the Greek donkey has changed. Instead of being a draught and pack animal on agricultural smallholdings, it is now mainly a companion animal for leisure and recreation, often kept as a single animal, or is used in agrotourism. There is also a growing interest in small-scale donkey milk production. In the agrotourism industry, feeding practices, health care and concern for welfare are not always ideal, largely from lack of knowledge.

There is considerable diversity among Greek donkeys, partly through origins and breeding and partly through environment and management. It is now difficult to recognize specific indigenous breeds and there has been a fair degree of arbitrary crossbreeding of local donkeys with jacks imported from Cyprus and Sicily and also French Poitou. Body heights among Greek donkeys thus range quite widely, from about 80 cm to 150 cm, and weights from 90 kg to 180 kg (Arsenos *et al*., 2010). Colours are mainly light, such as grey or grulla (slate-grey or tan-grey to mouse-coloured), but bay or bay-brown are also common. There is usually a dark dorsal line and shoulder cross.

The Greek word for donkey is γάιδαρος (*gaidaros* or *ghàdharos*). The Greek farm animal genetic resources report to the FAO in 2003 said that there were two local breeds, both widely used. The typical widespread local donkey, or **Ellinikon** (which simply means 'Greek'), is quite modest in size (102/96–110 cm, 90–120 kg), with a narrow chest, short back, relatively short legs and small hoofs. It has a short head and long broad ears pointing forwards. Most of the donkeys are grey with a black dorsal stripe and shoulder stripe. The rather primitive **Arcadian** used to be the main and most important type found throughout the country and has a typical height of 100 cm (range 95–120 cm; weight 90–120 kg). It tends to be brown with grey points and a dark dorsal stripe. It was displaced by larger types developed through crossbreeding and its status is

critical; it is found in the Peloponnese of southern Greece, where there is a long tradition of keeping donkeys.

Another small type is the **Perdikaki**, found in west central Greece (Perdikaki, known as Sakaretsi before the 1930s, is a mountain village in north-east Aetolia-Acarnania). It is grey with a dark shoulder cross and also with stripes on the lower legs. In contrast, there is the large Cyprus (*qv*), found widely on the mainland as well as in Cyprus itself.

Grigio Siciliano *see* Sicilian Grey
Grigio Viterbese *see* Viterbo Grey

Guangling (*N China: NE Shanxi*)
A large and strongly built donkey found in Guangling and Lingqiu counties in Shanxi province, the average height of the Guangling is about 130 cm (male and female) but there appear to be three body-size types: large, medium and small, with the latter at 110 cm tall. The Guangling is usually black with light points but may also be grey with light points or pure black. The maximum draught power is 152.5 kg and carrying capacity 400–500 kg. The donkeys are also used for meat, with a dressing percentage of about 45%.

Guanzhong (*NW China: C Shaanxi*)
This is one of China's best known donkey breeds and probably the only one to have been exported. It is found in the Wei river area on the Guanzhong Plain in Shaanxi province. Alternative names for the breed are *Kwanchung* or *Kuan-chung*, and in Russian *Guanchzhun*. It is usually black with pale points, or may be dark grey with shoulder bar. The Guanzhong is a large donkey (average height 133/130 cm, weight 264/248 kg), with a rectangular body shape, and is used as a draught, riding and pack animal. The females are especially valued as pack and riding donkeys on mountain paths. It has a maximum draught power of 247/186 kg and pack-carrying capacity of about 150 kg.

Had *see* Sudano-Sahelian
Hamadan *see* Iranian; Mary
Hamar *see* Ethiopian
Hararghe *see* Ethiopian
Hassawi *see* Egyptian
Hemione *see* Asiatic wild ass
Herzegovinian *see* Balkan
Hinny *see* Mule

Huaibei (*E China: N Anhui*)
The Huaibei is found to the north of the Huaihe river in Fuyang and Suxian counties of Anhui province. It is a compact donkey (average height 108–109/107 cm) of the North China type and is usually grey with a dark dorsal stripe and shoulder stripe. A draught animal, it is also used for meat (dressing percentage 43%).

Hungarian (*Hungary*)
There have been donkeys in Hungary since Roman times but they have never had a significant economic role in the country. However, between the two world wars there was some purposeful breeding of larger donkeys at the famous Mezőhegyes stud farm close to the Romanian border, based on imported Italian jacks, but this herd was dispersed in 1961. It was not until 2002 that a Hungarian Donkey Breeders Association (*Magyarországi Szamártenyésztök Egyesülete*, or MSZEN) was formed, with the intention of finding and registering the country's scattered donkey population. A year later a Hungarian donkey breed was formally recognized for the first time. It is known in Hungarian as *Magyar parlagi szamár* (Hungarian meadow or plains donkey – the word *parlagi* generally translates as countrified but usually implies meadowland) and the population by 2012 was 345 (the country's total donkey population is about 4000). It was declared a protected native breed in 2005. There are three groups within the breed, the rarest of which is the smallest (less than 100 cm), which has a soft coat, small mobile ears and a fine physique. Most of the donkeys belong to the second group and are of medium height (110–130 cm), with strong bones and a muscular body; they are described as unpretentious. The third group comprises a few descendants of the large Mezőhegyes donkeys, at least 130 cm tall and less refined in physique than the small type.

On the country's border with Austria, in the Lake Neusiedl national park, there is a small population of the Austro-Hungarian Albion (*qv*).

Idabari *see* Nigerian
Ile de Ré *see* Poitou

Indian subcontinent (*Bangladesh, Bhutan, India, Nepal, Pakistan and Sri Lanka*)
If the FAO statistics for this region are accurate, the numbers of donkeys and mules in Pakistan have risen dramatically in the past 50 years: in 1961 there were 950,000 donkeys and around 26,000 mules; by the 1970s there were 2.3 million donkeys and 70,000 mules; by the mid 1990s there were 3 million donkeys and 70,000 mules; and in 2013 there were 4.9 million donkeys and 200,000 mules. Numbers in Bhutan have risen slowly, from 12,000 donkeys and 4300 mules in 1961 to 18,000 donkeys and 5300 mules in 2013. The situation in India is very different: in 1961 there were just over 1 million donkeys and 53,000 mules, whereas in 2013 there were only 292,000 donkeys but the mule population had increased to 104,000 (though the government livestock census gave 670,000 donkeys and 220,000 mules in 2003). No returns were made in either of these years for Bangladesh (or East Pakistan, as it was in 1961), Nepal or Sri Lanka (known as Ceylon in 1961).

There has been no interest in characterizing different donkey breeds in India. All over the country the type is nondescript and small and is generally light grey to white, or black or piebald. The donkeys of Ladakh in the extreme north are similar to or the same as the Tibetan (*qv*). The **Indian wild ass** or khur, *Equus hemionus* (*see* Asiatic wild ass), is still found in the Rann of Kutch and deserts of Rajasthan and was possibly semi-domesticated in the Indus Valley of Pakistan and north-west India during the Harappan period (3300–1300 BC). The wild kiang (*qv*) is also present (Sikkim, Himachal Pradesh and Ladakh).

There are no characterized donkey breeds in Pakistan, even though it is appreciated that not all donkeys are the same. They are found countrywide as draught animals, carting everything from bricks to produce, a role in which they and mules are increasing, and donkeys are noted as the country's most disease-resistant livestock; yet they are held in low esteem. Jennies are sometimes used for ploughing in hilly areas and hauling fodder for other farm livestock, or carrying goods

and household items between villages. Mules have been valued by the Army for transportation in hilly areas, especially as pack animals able to endure greater hardship and more work than horses, and are also used for pulling carts to transport goods of various kinds in the cities. Less commonly, Pakistan's mules are used for ploughing or riding.

In Nepal, where the word for donkey is *gadha* and for mule *khacar*, donkeys are present and mules are used for transportation but there has been no work on differentiation or characterization of the species.

In Bhutan, although numbers are small, mule production is popular and the country's animal genetic resources report to the FAO in 2003 stated that the mule was preferred for its sturdiness, modest feeding during winter or during long journeys, longevity, and resistance to some of the important horse diseases. It was particularly useful on tracks that were too difficult for horses. The mule population is mainly in the east of the country (where mules form 20% of the equine population) and in the west (15%). The types of mule include *zendeng* (from Tibet, especially for riding), *lhodeng* (jack × local horse), *bondeng* (jack × Jata horse breed) and *dengtholong* (incidental cross of stallion and jenny, i.e. hinny). Farmers generally trade mules for higher prices than horses, which has encouraged horse owners to use jacks rather than stallions on their mares. Fearing that this practice would reduce the horse population, the government discouraged the distribution of jacks and instead tried to define 'mule breeding pockets' in the north of each of the country's four geographical zones, where jacks would be allowed only in those pockets that could 'supply the demand of mules to their geographical region'; at the same time, horse-breeding efforts would be encouraged outside these pockets.

In Sri Lanka the Puttalam (*qv*) is a rare feral donkey in the north-west.

Iranian (*Iran*)
Iran ('land of the Aryans'), or Persia, had a donkey population in 1961 of 2.03 million (fourth highest in the world at the time) and 231,000 mules. In 2012 it was 1.6 million donkeys (seventh in the world) and 175,000 mules. It is also home to the critically endangered Iranian or Persian onager, *Equus hemionus onager*, now restricted to two protected areas within the country (*see* Persian onager). The Persian onager has never been domesticated but the **Benderi** apparently originated from onager crossed with Iranian donkeys in southern Iran.

The small native Iranian donkey is also known as the *Persian*. The **Hamadan** donkey is usually white and includes an undescribed variety known as **Kashan**. The Hamadan is found in neighbouring Turkmenistan as well as in Iran and is similar to Turkmenistan's large Mary (*qv*). J.C. Loudon, writing in the 1820s, stated that there were two sorts of ass in Persia: one slow and heavy, for carrying burdens; the other kept 'like horses' for the saddle, a type with smooth hair, carrying the head well, with a much quicker motion and that had been taught to 'amble' for a comfier ride (the rider sat 'nearer the buttocks') at 5–6 mph. This second type customarily had its nostrils deliberately cleaved to give it a greater breathing capacity. Loudon stated that the 'spirited and agile' saddle ass had been brought from Arabia. Mules were also much in demand in Persia.

Iraqi (*Iraq*)
The history of donkeys in Iraq stretches back into the times of ancient Mesopotamia, when they were used as draught and pack animals and also for ploughing. It is said that, before the introduction of horses into the region, donkeys were crossed with onagers (*see* Persian onager) to produce bigger and stronger mule-type draught animals for use by the military.

Today the donkeys of Iraq are of no particular breed; they are simply a widespread local type that has not been characterized. The name *Shuhri* is sometimes used. The donkeys supply up to 85% of animal working power in the country, the remainder being from camels and horses. Their numbers have been declining, dropping from 558,000 donkeys and 104,000 mules in 1961 to 380,000 donkeys and only 11,500 mules in 2013.

Irish (*Ireland*)
The population of donkeys and mules in Ireland has been remarkably high. For example, in 1961 there were more than 89,000 donkeys and nearly 3000 mules, though by 2013 the numbers were down to 6100 donkeys and 1200 mules. In the 1890s there had apparently been about 200,000 donkeys and mules on Ireland's farms, compared with 700,000 in Italy (which had Europe's highest population at the time) and 400,000 in France.

Yet donkeys are relatively recent arrivals in Ireland. The earliest documented reference is in 1642, relating to a single donkey taken as part of the spoils during the capture of a castle, and there are scattered references to donkeys during the 18th century, when their milk was consumed by the wealthy for health reasons. In the 19th century, however, donkeys became widespread and numerous as working animals. Part of the reason for their sudden popularity seems to be that during the Peninsula war (1808–1814) against Napoleon there was a strong military demand for Irish horses and it seems that donkeys were brought into Ireland from England (and perhaps Spain) to trade for horses and replace the loss of horsepower on the farm. Small-scale Irish farmers, traders, peat-diggers and others, especially in the west of Ireland, soon discovered that donkeys could do much of the work that had previously been undertaken by horses and ponies, and were much cheaper to keep. The age of the Irish donkey as a farm and transport animal (pack and cart) was born. By the late 19th century, Irish donkeys were regularly being exported in their thousands to London (*see* British).

It is an interesting aside that a high proportion of the British army fighting in the Peninsula were Irishmen. And, whimsically, one wonders about the Spanish presence in Ireland's Great Blasket island in 1597: a document in the archives in Samancas, written by a ship's captain, claimed that the inhabitants of the Great Blasket Island (or, as he called it, Yslas de Blasques) were all fluent in Spanish. The island is just off the Dingle coast of Co. Kerry in the extreme south-west of Ireland. It was claimed by several writers who lived on the island in the 1920s that the islanders used donkeys rather than horses, that the donkeys carried turf in panniers from the mountains and sand and seaweed from the shores, that they were never harnessed for ploughing and that only males were used, because the land was so steep that the presence of in-season jennies would have led to the donkeys driving each other over the edge of the cliff. A likely Irish tale!

Today the donkeys of Ireland are more often maintained as tourist attractions or companions or for riding by children than as working animals. No records are kept of donkey pedigrees and the population trend is not known, though 1200 EU passports for donkeys have been issued by the Irish Horse Board since 2005.

Over the decades there have sometimes been references to the '**Irish piebald**' or 'pied' as if it were a breed, but the broken colouring is seen in various parts of the world and there is no specific Irish breed, piebald or otherwise. Donkeys from both Ireland and England found their way to Australia and New Zealand, especially from the 1970s, where they are sometimes referred to as the 'English/Irish' (*see* Australian Teamster) but, again, they cannot really claim to be a breed: they are simply small and sturdy donkeys that originated in England and Ireland.

Irpinia *see* Italian
Istrian *see* Croatian

Italian (*Italy: mainland and islands*)
Donkeys are depicted in ancient rock paintings dating to around 2000 BC in the Apennine Peninsula (i.e. mainland Italy) and it is known that, in ancient Roman times, donkeys were widely used as pack animals, in agriculture and to power various types of mill and other equipment and also that pack donkeys and mules were used in large numbers in Roman military campaigns. For example, in the 2nd century BC, each Roman legion was accompanied by at least 1400 donkeys to carry the army's supplies, and every eighth legionary received a donkey to carry tents and other equipment. Donkeys remained essential in many parts of Italy for many centuries. However, although Italy has been proactive in identifying and conserving its livestock breeds for most species, there has been notably less national interest in donkeys until recently: as in so many other countries, the animals were taken for granted. The island breeds of Sardinia and Sicily tend to attract more attention than those of mainland Italy.

Despite the typical European trend for a sharp decrease in donkey populations, there is the beginnings of an almost imperceptible reverse trend in Italy in the new century. For example, in 1941 there were 640,000 donkeys (120,000 of which were in Sicily). In 1961 the FAO statistics for Italy had been 499,000 donkeys and 334,100 mules, but in 1981 the number was 128,800 donkeys and 81,600 mules. By 2000 the total population had dropped to only 23,000 donkeys and 10,000 mules. In 2013 the FAO statistics gave 24,000 donkeys and 9000 mules – both numbers mere fractions of the populations in the first half of the 20th century.

In 1983 only five indigenous Italian donkey breeds were noted. In 1992 the SAVE Foundation identified eight breeds, three of which were endangered (population 100–1,000) and five critically low (population of fewer than 100 individuals); several more were already extinct.

The *Report on the State of Animal Genetic Resources in Italy* (2005) for the FAO AnGR project mentioned asses only in passing: it stated that the country had about 19,000 asses and 4543 'other equids (mule, bardotto)'. It listed the names of the country's equine breeds for horses but not of donkeys. Then in 2007 MiPAAF (Ministero delle Politiche Agricole Alimentari e Forestali) listed six donkeys as being officially recognized; and the following year there were eight recognized autochthonous breeds. In 2007 the FAO noted four breeds that were endangered, another seven that were critically endangered and a few others that were already extinct. The Amiatina, Asinara, Martina Franca, Ragusano and Sardo were considered to be in need of further research and conservation. In 2010 the *Piano Nazionale sulla Biodiversità di interesse agricolo* listed the Amiatina, Martina Franca, Ragusano and Sardo as endangered, the Asinara, Baio Lucano, Grigio Siciliano, Pantelleria, Romagnolo and Sardo Grigio Crociato as critically endangered and the Cariovilli, Grigio Viterbese and Sant'Alberto as extinct. It also included the Monti Lepini as in the course of being recorded.

To summarize the current situation, all of Italy's remaining donkey breeds are endangered to a greater or lesser extent. There are separate entries for the eight that are officially recognized as autochthonous breeds of limited distribution: Amiatina (dell'Amiata) in Tuscany; Asinara in Sardinia; Martina Franca in Puglia; Pantelleria (Pantesco) in Sicily; Ragusan(o) in Sicily; Romagnola in Emilia-Romagna; Sardinian (Sardo); Sicilian Grey (Grigio Siciliano). There is also a separate entry for Viterbo Grey (Grigio Viterbese) in Lazio.

Other populations that have been described as very minor or extinct include Argentato di Sologna (*see* Romagnola), Cariovilli (found in Abruzzo: Aquila), Castelmorone (in Campania: Caserta), Irpinia (in Campania: Benevento and Avellino), Monti Lepini (*see* Viterbo Grey), Pugliese and its subraces della Basilicata, Leccese and delle Marche (*see* Martina Franca), Sant'Alberto (*see* Romagnola), San Domenico, Sant'Andrea and San Francesco. Little is known about the last three.

For general guidance, Italian terms for coat colour include *baio* (bay), *bianco* (white), *grigio* (grey), *marrone* (brown), *morello* (black) and *sauro* (chestnut). Other terms include *chiaro* (light), *scuro* (dark), *grigio ferro tasta de moro* (black roan), *roano* (bay roan), *ubero* (chestnut roan), *sorcina* (wild colour with dorsal stripe), *pezzato* (pied) and *lista* (a facial blaze).

Jack Norteamericano *see* American Mammoth Jackstock
Jegue *see* Brazilian
Jerico *see* Brazilian

Jiami (*NW China: N Shaanxi*)
This is one of China's better known breeds and its synonyms include 'four-eyebrows', 'swallow-coat' and *Siumi*. It is found in the Shaanxi counties of Jia(xian), Mizhi (hence 'Jiami') and Suide, all in the east of Yulin prefecture, which is the northern extreme of Shaanxi province and is part of the Shanbei area that includes all of the northern portion of the province (*see also* Shanbei). A fairly large and symmetrical donkey, around 126 cm in height and say 220 kg in weight, the Jiami is a pack animal that is also used for the production of fine-textured meat (dressing percentage 49%). Its average pace, carrying 360 kg, takes it a little over 4½ hours to cover 20 km. The coat is dark to black with pale points.

Jimma *see* Ethiopian

Jinnan (*N China: S Shanxi*)
Also known as the *South Shanxi*, the Jinnan is found in Xia and Wenxi counties in Yuncheng, the southernmost prefecture in Shanxi province. It is a large donkey (height 136–7 cm, weights 236/221 kg) and can carry a load of 500 kg for 30–40 km a day.

It is also used for meat production (dressing percentage 52.7%). The coat colour is usually black, often with pale points, but grey or chestnut are also seen.

Jordanian (*Jordan*)
In early 2014 it was announced that the number of donkeys in Jordan had dropped to 5657 from a total of more than 14,000 in 1997. The Ministry of Agriculture declared that it was working on increasing the number of donkeys to avoid their extinction. Donkey traders claimed that the type best suited to farmers and livestock breeders was the **Al-Salibi** 'crusades' donkey, described as the most handsome of all as it was 'bright white, tall and slim and looks very much like a mule'; it had a 'peaceful nature' and was extremely patient and useful 'in cultivating the earth and can walk for long distances with cattle . . . and works with the energy of 10 donkeys' (*Ammon News*, 6 February 2014). Only two types of Jordanian donkey are described in the kingdom's DAD-IS reports: an indigenous '**Black**' of small to medium size (the Arabic word **Baladi**, meaning native, is sometimes used to describe it); and the large grey **Qubressy** (*Kubrusi*) or Cypriot (of which Al-Salibi appears to be a synonym), but no further information is available about either type, except that they are both in danger of extinction. The country report on the state of Jordan's animal genetic resources, on which the DAD-IS information is based, was generally dismissive of donkeys: it noted that their numbers were falling (there were stated to be 18,000 but it was admitted that statistics were unreliable and the true figure was likely to be substantially lower), largely because they had been Jordan's main draught animal on farms (especially ploughing) but had been replaced by tractors and vehicles and were no longer used as farm labour. Donkeys are still being used by the tourist industry as riding and pack animals, but there appears to be little interest in their welfare or their characterization.

Kakhetian *see* Caucasian
Kano *see* Nigerian
Karakaçan *see* Anatolian
Kara-Kalpack *see* Central Asian
Kashan *see* Iranian
Kashi *see* Xinjiang
Kassala *see* Ethiopian; Sudanese
Kazakh *see* Central Asian
Kentucky *see* American Mammoth Jackstock
Khulan *see* Asiatic wild ass
Khur *see* Asiatic wild ass

kiang (*Tibetan Plateau; also Nepal, Pakistan and India*)
The kiang, *Equus kiang* (formerly *Equus hemionus kiang*), has fared better than the other wild ass species (*see* African wild ass, Asian wild ass) and it is deemed to be at only low risk, due to its wide distribution and large population. The distribution area is central Asia, centred on the Tibetan Plateau (especially north-west Chang Tang nature reserve) at 2700–5400 m above sea level , and it is estimated that there are 60,000–70,000 kiang in China (90%), Nepal, Pakistan, India and possibly Bhutan, now mostly found in protected areas or those under military jurisdiction. There are three subspecies or clines based on geographical range: the western kiang (*E. k. kiang*) in Tibet, Ladakh (India) and south-western Xinjiang; the eastern kiang (*E. k. holdereri*) of Qinghai and south-eastern Xinjiang; and the southern kiang (*E. k. polyodon*) of southern Tibet and the Nepalese border. They inhabit various types of grassland and are most abundant in steppes and high-altitude meadows but are also found in drier areas. Habitat loss is a continuing threat, along with the transmission of disease from domestic horses and competition with livestock for forage and water.

The kiang is the largest of the wild asses (132–142 cm, 350–400/250–300 kg) and possibly the most elegant and most horse-like in conformation. The coat is chestnut in colour, ranging from dark brown in winter months to reddish brown in summer, with a woolly undercoat in winter. The underparts, muzzle and insides of the relatively short ears are whitish. There is a wide dark brown dorsal stripe from the mane to the tail tip's blackish-brown tuft, but there are no leg stripes or shoulder stripe. The southern kiang is the smallest, and the eastern is the largest. Like other wild asses, the kiang is mainly a grazer but will also browse, though they obtain most of their water from forage. The animals are usually solitary or in small herds but sometimes come together in herds of up to several hundred animals or, in times gone by, up to a thousand.

The kiang has never been domesticated. In captivity, it has been crossbred with domestic donkeys, horses and Burchell's zebra but the offspring are sterile.

Kirgiz *see* Central Asian
Kuce *see* Xinjiang
Kulan *see* Asiatic wild ass

Kulun (*N China: E Inner Mongolia*)
The Kulun is found in what used to be Inner Mongolia's Jirem League (now Tongliao) in the south-western banners (counties) of Hure (or *Kulun Qi*) and Naiman, on the border with Liaoning province. The Kulun is a compact donkey with sound legs; its average heights are 120/110 cm. It is used as a pack, riding or draught animal and is capable of carrying 200–250 kg for a period of 4–6 h at a speed of 10 km/h. The coat is black or grey with white points.

Large Standard *see* American

Las Encartaciones (*N Spain: Biscay, Basque country*)
Enkarterri, known in Spanish as Las Encartaciones, is a *comarca* in the north-west of the Basque Country (Pais Vasco, or Euskadi) province of Biscay. The local donkey is broadly similar to the Pyrenean (*qv*) of south-west France and it used to be found on every small farm and in every village as an indispensable means of transport and beast of burden. It was also used by miners along the Cantabrian coast. With increasing mechanization in agriculture, forestry and mining during the 20th century, the Las Encartaciones donkey almost became extinct. In 1996, ADEBUEN (*Asociación para la protección y Defensa del Burro de Las Encartaciones*) was formed to conserve the breed, which remains critically endangered. It is black or dark chestnut in colour, with light points, a characteristic white muzzle (*bociblanco*) and sometimes a dark dorsal stripe or with leg stripes. Some individuals may be grey or white. The ears are comparatively small and it has an average height of 120 cm at the withers (considerably shorter than other Spanish donkeys). Its weight rarely exceeds 200 kg: it is formally described as the only *raza asnal elipométrica* in the Iberian peninsula, i.e. it is

small by weight, compared with hypermetric (large) and eumetric (medium) animals. Its population in 2005 was around 100 breeding animals.

Liangzhou (*NW China: Gansu*)
This donkey remains abundant in an area that was once traversed by the Northern Silk Road (or Hexi Corridor) between the Tibetan Plateau and the Gobi Desert that linked Northern China with Central Asia. The Liangzhou is found in the agricultural prefecture of Wuwei in north-west central Gansu and is named for the central of Wuwei's four distrticts. It is usually black or grey with a dorsal stripe and shoulder stripe. The donkeys are quite small (102 cm), with a head of moderate size, straight level back and long strong legs. They are capable of carrying 250–300 kg for 30–50 km a day.

Linxian (*N China: W Shanxi*)
Named for Lin county in Shanxi province (rather than Lingxian, or Ling county, in Dezhou, Shandong), the Linxian had become relatively rare by the late 1970s. It is solidly built, with an average height of about 118 cm and weight 180 kg, and is usually black with white points. Its draught power is around 160 kg and it can carry 300–350 kg over 30 km a day. It could plough 3–5 mu/day (say 0.2–0.3 ha).

Littoral-Dinaric *see* Croatian
Macedonian *see* Balkan
Majorcan *see* Balearic

Majorero (*Canary Is.: Fuerteventura*)
Fuerteventura, the second largest of the Spanish Canary Islands, lies within 100 km of the Atlantic coast of north-west Africa (Morocco, a country with 950,000 donkeys) and has been invaded or explored variously by, firstly, ancient North African settlers known as Majorero (a name still given to the island's people today) and later by the Phoenicians, Spanish, Portuguese, Italians, French and English, and also by Berber pirates in the 16th century. It is assumed that the indigenous donkey originated from north-west Africa in the 15th century; it was probably introduced around 1450 and quickly became adapted to the local arid climate and terrain of this volcanic island. Apparently it thrived: there are written accounts that in the 1580s a group of notables, including a bishop, a general, a poet and a historian, participated in a massive hunt on Fuerteventura (accompanied by soldiers and dogs) during which more than 1500 donkeys were killed. It appears that the animals had proliferated 'beyond belief' and many had become feral in the hills, causing a nuisance to local inhabitants. Despite this onslaught, donkeys continued to be strongly favoured as working animals on the islands: there were no horses, partly because the land on flatter islands such as Fuerteventura and Lanzarote lacked pasture, while on the well vegetated islands the land tended to be steep (crops were grown on terraces), and in both situations the donkeys could thrive and work. They hauled water, wood and agricultural products; they transported riders along steep paths; they could even be seen in mixed teams with camels ploughing the fields. They remained popular until well into the 20th century, but then, like other Spanish donkeys, they began to be replaced by agricultural machinery and motorized transport. In the 1960s/70s it was still quite common to see herds of 30–40 donkeys travelling the islands to be hired for work in rural areas, but they lost their traditional role in carrying water and goods as the roads began to improve. The situation was compounded by migration of scattered rural populations into the towns on the main islands and the gradual loss of agriculture in favour of tourism as a major source of income.

Although in the past the Majorero had spread to other islands in the group and had been crossbred there with imported Andalusian donkeys, it was always most at home in Maxorata, the northern part of Fuerteventura and thence to Lanzarote. The total population in the Canary Islands is now only about 200, all of them on Fuerteventura, and the Majorero is recognized as critically endangered. It was officially recognized as a breed in 1997 and there has been a conservation programme since 2000, managed by the University of Barcelona in collaboration with an association for the preservation and promotion of the *Burro Majorero* and with funding from various government agencies. It has become little more than a companion animal, or part of the growing tourist industry. The Majorero is particularly well suited to short local journeys.

It is of a North African type, standing at 100–120 cm at the withers and weighing perhaps 125–175 kg. The general appearance is well proportioned and harmonious. Despite looking quite fragile, it is a thoroughly rustic, lively, energetic, resilient and long-lived donkey, able to cope with deprivation. The colour of the short soft coat, varying from light to dark grey with light points, seems to be dependent on local factors such as environment, nutritional status and season, but there is always a dorsal stripe and shoulder stripe and there are 'zebra' stripes on the legs. The expressive erect ears are of medium size, the mane is short and upright, the body is relatively short with a strong, straight back; the legs are strong and sturdy.

Mali *see* Sudano-Sahelian
Mallorquin *see* Balearic

Maltese (*Malta*)
Strategically placed in the central Mediterranean, the island of Malta, independent since 1964, is one of the world's smallest countries and has been subjected to many different cultural influences over the millennia. Donkeys and mules have a very long history on the island but, as elsewhere in Europe, their numbers have declined considerably in the past half a century. In 1961 there were about 2400 donkeys and 1600 mules; in 2013 there were just 480 donkeys and 300 mules (the human population is around 450,000). The government's agricultural research and development unit has a conservation programme in place for the critically endangered Maltese donkey or *ħmar Malti* (*ħmar* is the Maltese word for donkey).

It has been suggested that the Maltese is Arabian in origin. It was traditionally used as a draught and transport animal and also for donkey racing (it is still used as a trotter today) and for the production of meat and mules. It was the latter role in which it has made its mark in history. Maltese donkeys were imported by George Washington and others in the late 18th century and Washington's black 'Knight of Malta' contributed to the creation of the American Mammoth Jackstock (*qv*). The Maltese jacks were large, though not as big as the Spanish breeds that also formed the basis of the American Mammoth,

and they donated their special qualities of agility and vigour. They were also exported to Australia in the mid-19th century.

The Maltese stands at an average of 150/143 cm at the withers. It has a short and unusually glossy coat that is dark bay, brown or black in colour, with a white muzzle. It is noted for its well shaped head and ears. Its well known vigour is often accompanied by a fiery disposition, especially in jacks, which means that handling them can be difficult.

Mammoth Jack Stock *see* American Mammoth Jackstock
Mannar *see* Puttalam

Martina Franca (*SE Italy: Taranto, Apulia*)
This very dark-coloured donkey is Italy's largest (average height 135/127 cm) and it originated in the Martina Franca area in Taranto province, Apulia (Puglia) region, in the heel of Italy. Its various synonyms include *Pugliese*, *Puli* and *Apulian*. The legend is that it originated from Catalan donkeys imported by the counts of Conversano in the early 16th century during the period of Spanish domination, but it is likely that there was already a dark-coated donkey in the Martina Franca region and that perhaps it was improved by crossing with the Catalan (*qv*). It is well adapted to the marginal land of the rock-strewn limestone Murge plateau hills of south-east Murgia, where its traditional role has been as a draught and pack donkey and also for use in crossbreeding with Murgese mares to produce mules.

During World War I, mule production with the Martina Franca proved highly successful and in 1926 the ministry of agriculture encouraged a selective breeding programme to improve the Martina Franca in this role. The mules were also used in World War II but, thereafter, the Italian army (until then the largest purchaser of the mules) lost interest. The population of the Martina Franca declined and so did the size of the animal, accompanied by an increasing degree of inbreeding. Over the period 1966–1997, the average male height decreased from 140 cm to 138 cm and the weight from 314 kg to 308 kg. The trend was reversed and between 1998 and 2002 the height increased again to 142 cm; however, the average weight declined further to 302 kg. In 1990 ANAMF, a national association of Murgese horse and Martina Franca donkey breeders, was formed to conserve and improve the two local breeds and re-establish stud books and breed standards.

The coat of the Martina Franca is blackish (*morello*), with dark grey abdomen and inner thighs, pale mealy muzzle and tan-edged haloes around the eyes. The mucous membranes are dark. The head is large but well proportioned, with well developed jaws; the ears are long, straight, broad at the base and hairy; the face is broad and flat with prominent orbital arches; the neck is strong and the general physique is muscular, robust and well developed. It is one of Italy's endangered breeds: the total population in 2007 was around 950, including about 430 breeding females.

Mary (*SE and S Turkmenistan*)
More than 70% of Turkmenistan's land area is occupied by the very hot Karakum desert. The Mary province is in the south-east of the country, where it borders Afghanistan, and its capital, also named Mary, was preceded by the important and ancient oasis city of Merv, which stood at a strategic point on the Great Silk Road and witnessed countless caravans of donkeys and camels passing through before and during medieval times. It is in this area and in the adjacent province of Ahal (bordering Iran) that donkey breeding has been taken more seriously than in most of Turkmenistan.

The Mary or Merv donkeys are similar to the white Hamadan (*see* Iranian) and are bred for size with a view to producing mules. They are typically 119–120/116–118 cm at the withers, though some individuals might be as tall as 130–142 cm. When Turkmenistan was part of the USSR (1924–1991), hybridization experiments were carried out at the National Horse Breeding Research Institute in which Mary jack asses were bred with heavy draught mares for pack and transport mules. The transport mules were from Lokai mares and were challenged with a difficult 90 km route up to an altitude of 3000 m; their average speed was 6.3 km/h. Pack mules for mountain areas were deliberately not bred very large: efficient movement and good balance were of the utmost importance and a short pace reduced the swaying of the pack and gave steady movement on poor tracks.

Turkmenistan is also home to the remnants of the wild **Turkmen kulan**, *Equus hemionus kulan*, or Transcaspian onager, which used to number thousands when it was all over the country in the 19th century. By 1941 there were only 250 animals left in the wild and the Badkhyz Zapovednyk (nature reserve) was established to protect the species. The decline continued and by 1955 there were only about 120–150 kulan in Turkmenistan. By the early 1980s there were around 2000 and small numbers were relocated to other sites, but between the mid-1990s and 1999 the Badkhyz population crashed to around 300, mainly because the large herds needed to move in search of water outside the reserve and began to decimate local crops at a time of local famine; they were killed in large numbers for meat. Most of the naturally occurring population are now in the Badkhyz nature reserve under the protection of rangers: there were around 900 in the reserve in 2005 and another 400–500 in various reintroduction sites in Turkmenistan. There are also small reintroduced populations in Kazakhstan and Uzbekistan. The taxonomy between the Turkmen kulan and the Persian onager (*qv*) remains to be clarified and there is a small onager/kulan hybrid population in Israel.

Masai (*Kenya, Tanzania*)
Kenya's northern border adjoins Ethiopia, home to the second highest donkey population in the world. More than 80% of Kenya's surface area is categorized as arid or semi-arid land, well suited to donkeys. Strangely the country does not submit any returns at all for donkeys or mules in its FAO statistics. However, in its animal genetic resources country report published in 2003 (with a foreword by the Permanent Secretary of the Ministry of Livestock & Fisheries Development, the aptly named Daniel M. Mule) it was stated that the donkey population was about 0.52 million (compared with 0.85 million camels). In the 1950s donkeys had been 'fairly numerous in native areas', but mules were little used. The main role for Kenya's donkeys is as draught animals. There are two types: the Masai, which is brown, and the Somali (*qv*), which is grey. The Masai is also in northern Tanzania.

In Tanzania, according to government statistics, the number of donkeys was 491,000 in 2001, but the FAO statistics for each year from 2001 to 2012 give only 182,000 (compared with 143,000 in 1961). Tanzania's donkeys are kept in low-input subsistence systems and are said to maintain an important role in rural areas as draught animals, but cattle contribute 70% of the national animal draught power. Donkeys are used for pulling carts, carrying loads, riding and ploughing. It has been noted that those in the Coast region and Zanzibar are larger than those in the hinterland. There is mention of three indigenous 'breeds', all widely used and none at risk: the **Zanzibar**, the **Brown** (i.e. the Masai) and the '**Stripe**', none of which have been further described or characterized. There has also been reference to a so-called **Muscat** donkey in Tanzania, a light-coloured type associated with Arabs and said to be descended from Egyptian donkeys or from Arabian ones introduced long ago from the Gulf region.

In Uganda, donkeys are kept mainly for draught power and are found mainly near the Kenyan border in Sebei (Kapchorwa) and Karamoja (in semi-arid north-east Uganda), where they graze with cattle and are left to breed at random.

Masri *see* Egyptian
Mauritanian *see* North African
Mediterranean Miniature *see* Miniature
Mekadi *see* Sudanese
Merzifon *see* Anatolian
Meskhet-Javakhet *see* Caucasian

Mexican Burro (*Mexico*)
Mexico has – or had – one of the world's largest donkey and mule populations. According to FAO statistics, there were 3.28 million donkeys and 3.285 million mules in 2013, compared with 2.89 million donkeys and 1.55 million mules in 1961. However, Mexican government statistics suggest that the number of donkeys rose from 2.68 million in 1952 to 3.3 million in 1970, but had fallen to only 1 million in 1991 and 581,000 in 2007, though the FAO data for 2007 showed 3.26 million donkeys and 3.28 mules, while the 1991 FAO figures were 3.188 million donkeys and 3.19 million mules.

Whatever the true population data might be, it is fair to say that the once ubiquitous Mexican donkeys and mules are rapidly being replaced by tractors, pickups and motorcycles all over the country and their role as working animals is fast declining, except among the older generation of peasant farmers. No doubt donkey festivals and burro polo will continue for a while and the animals will be used in agrotourism, but they are more a part of Mexico's history than its future.

Donkeys first came into eastern Mexico with Spanish settlers in the early 16th century and would have arrived at intervals at the port of Veracruz for much of the colonial period along with other livestock. They were crucial to central Mexico's early gold- and silver-mining industries, carrying equipment and supplies, ores and miners. The burros moved northwards with miners, farmers and ranchers and settled in areas such as Guadalajara and Guanajuato in the 1520s and 1530s. They entered the arid southern lands of what would become the American state of New Mexico in 1598 during its first settlement by Europeans – and doubtless accompanied Francisco Vasquez de Coronado there in his huge expeditions in the early 1540s. In due course, settlers used donkeys and mules for ploughing light land as well as pulling carts and being ridden. Later, jennies were familiar in larger cities as milk producers, accompanying their owners from door to door to be milked on the spot for the householder.

There has never been any attempt to develop donkey breeds in Mexico and they are simply known as the Mexican burro. Like most of those of South and Central America and the West Indies, they are criollo donkeys (*qv*), descended from animals introduced by the Spanish and becoming locally adapted over the centuries. The term criollo (or crioulo or créole) is applied to humans and livestock that are born locally but whose ancestors, however distant, were European. Apart from Brazil, none of the countries in this large region have specific donkey breeds.

Miankala *see* Sudano-Sahelian

Miniature (*USA*)
There have been small stocky draught and pack donkeys in the Mediterranean for many centuries, especially on islands such as Sardinia and Sicily (*see* Sardinian; Sicilian Grey). Traditionally they were used as pack and draught animals and also provided the power for domestic grindstones.

In 1929, American stockbroker Robert Green imported a group of small Sardinian donkeys for his New Jersey farm. He had built up his herd to more than 50 donkeys by 1935 and sold several to others, who also imported their own small donkeys from the Italian islands. In the early 1950s a family in Omaha, Nebraska, began to breed miniature donkeys professionally and eventually had a herd of up to 225 animals, most of them 32 in (80 cm) or smaller, stocky in conformation and grey-dun in colour. In 1958 the family formed a Miniature Donkey Registry (overseen from 1987 by the American Donkey and Mule Society, ADMS) and the maximum mature height of this naturally small new breed was established as 36 in (about 91 cm). With a rapidly growing interest in small pet and show donkeys in the late 1980s, a National Miniature Donkey Association was formed in 1989 to promote the breed and soon it was being exported to countries such as Canada, Australia and New Zealand. Since the turn of the century it has also been exported to the UK, Ireland, France, Germany and the Netherlands.

There are several hundred Miniature donkeys in the UK, where they were originally imported from Canada and the USA and are registered with the Miniature Mediterranean Donkey Association. In North America there are now in the region of 10,000–15,000 Miniature donkeys, or possibly many more (not all are registered) – in sharp contrast to the rapid decline to near extinction of their ancestors in the Mediterranean. In 1997 about 2600 had been registered with the Miniature Donkey Registry and by 2009 the total number registered over the years amounted to more than 57,000, of which about 4000 had been registered in 2008.

The Miniature is sometimes known as *Mediterranean Miniature*, *Miniature Mediterranean*, *American Miniature* or incorrectly as *Sicilian* (their roots were more often in Sardinia than in Sicily, though the types were very similar). The weight is in the region of 90–160 kg. Dwarfism (often indicated by a disproportionately large head) is not encouraged and the recommended minimum height is 30 in (76 cm); smaller animals

might have foaling problems, poor conformation and lack of balance. The general conformation is compact and well rounded, the back straight or slightly dipped, the legs are as straight as possible and long enough in proportion to the size of the body; a shorter head with a broad forehead is preferred to a longer one; the facial profile is straight or slightly convex, the eyes are large, dark and prominent, the ears are upright and proportionate (not too long). The neck should be strong and straight but a short broad neck 'does not allow for good control under the bit while driving'. The coat varies individually in texture and length. Coat colour is not a criterion and many variations are seen in addition to the original grey-dun with light points and dark dorsal and shoulder stripes. Basic colours might range from light tan to very dark chocolate, almost black, and occasionally there are roan, sorrel, spotted or white individuals. Some have dark points rather than light points. Colours recognized by the Miniature Donkey Registry in USA are: grey-dun; grey, black or brown, or red roan; black with cross; black, no cross; blue-eyed white (ivory); unusual colours (cameo) or combination colours (red/grey-dun = rose dun); red; brown; spotted (on all base colours); frosted spotted white. In the UK most of the donkeys are 'grey-dun with chocolate highlights' but other colours include brown, black, slate grey, sorrel, cream, spotted, piebald and skewbald.

Miranda (*NE Portugal*)
The donkey population in Portugal is falling (*see* Table 1), but there is a lack of official information about Portugal's donkeys and they are rarely mentioned in historical records. The 2004 report to the FAO on the country's animal genetic resources gives a figure of approximately 55,000 donkeys and mules, but says nothing further about them; there is far more interest in Portugal's horses. The only donkey breed that is listed in the country's DAD-IS returns is the *Burro de Miranda* (or *Burro do Planalto Mirandes*) with a population of 800–1200 in 2010, of which 800 were breeding females; no other details are given in the return. There had been four times as many Miranda donkeys in the 1970s.

The breed is named for the Terra de Miranda region, where it has a long history as a farmer's donkey working in the highlands. The area, which is much visited by Spanish tourists, has very hot dry summers but cold snowy winters; there is a wide temperature range. It is an isolated part of the country in the Bragança district in the extreme north-east of Portugal and close to the Spanish town of Zamora; and it has become increasingly depopulated.

In 1999, the International Douro Natural Park (*Parque Natural do Douro Internacional*), along the Douro river that forms the Portuguese/Spanish boundary, sponsored a study investigating the donkeys in its area and it was found that there was enough biometric evidence to group the donkeys of Miranda do Douro and part of Mogador (on the Mirandese Plateau) as a breed. Its characteristics were similar to those of Spain's Zamorano-Leonesa (*qv*). The traditional roles of the Miranda included pack, saddle and driving for smallholders and the production of mules.

The demise of the Miranda has been hastened by not just mechanization but also the increasing age of those who remain in this very rural area. Almost all of those who still own the donkeys are in their 70s or older and the animals have become companions rather than workers. The Miranda has been classified as an endangered breed since 2003 and is under the watchful eye of an association for the study and protection of asinine livestock, AEPGA, founded in 2001. There is now a stud book and a conservation programme for the Miranda, which is also seen as important in the cultural heritage of Portugal.

The docile and friendly Miranda has a dark brown coat with pale points. The coat is often long and thick, as protection against the region's challenging winters. It is an exceptionally hardy and well adapted animal, described as rustic. The head is massive, with a short muzzle, thick lips and beady eyes. The large ears, wide at the base and rounded at the tip, are abundantly hairy. The neck is short and thick, the chest deep, the legs are thick and hairy, with the abundant coat covering the broad hoofs. The back is short and muscular and the general physique is robust and burly. The height is in the range of 120–135 cm. It is hoped that agrotourism might be instrumental in saving the breed.

The only other Portuguese 'breed' is far away in the mid-Atlantic Azores on volcanic Graciosa Island, which was first settled by the Portuguese in the mid-15th century. The **Graciosa Dwarf** donkey is very small and very rare, with perhaps only 20 remaining. It is grey with a black dorsal stripe and shoulder stripe. The Biotechnical Centre at the University of Azores has a project to characterize and conserve the Graciosa Dwarf and is also conserving the equally rare Terceira pony.

Miyang (*SC China: S Henan*)
The Miyang appears to be named for a county in the prefecture of Zhumedian in southern Henan province; it is also found in Suipin in Zhumedian, and in several counties (Fangcheng, Sheqi, Tanghe) in Nanyang prefecture, which is also in southern Henan, and in counties such as Ye(xian), Xiang(xian) and Wugang in Pingdingshan, a more central prefecture in Henan. There is also possibly some link or confusion with Biyang, another county in Zhumedian that borders Nanyang's Tanghe and Sheqi. The Miyang is described as having a medium body size and 'square' conformation, an average height of 120 cm and weight 190 kg, and a black coat with white points. It is a draught and pack donkey and can cover 40–50 km a day carrying 100–150 kg. It is also used for meat production (dressing percentage 48.3%).

Moldavian *see* Romanian
Monti Lepini *see* Viterbo Grey
Moroccan *see* North African
Moruna *see* Spanish

Mule
A **mule** is the offspring of a jack mated with a horse mare; a **hinny** is the offspring of a horse stallion and a jenny. The donkey has 62 chromosomes, the horse 64 chromosomes and the hybrid 63 chromosomes.

The hybrids combine the size and power of the horse with the hardiness, thrift and surefootedness of the donkey. Broadly speaking, the head and forequarters of the hybrid resemble those of the sire; the hindquarters (including tail) resemble those of the dam. Both hybrids exhibit hybrid vigour and are

larger in body size than the donkey parent, but the hinny tends to be smaller than the mule. Mule colours include all of those seen in donkeys and horses; most mules have the donkey's light points and many have shoulder crosses or leg stripes.

The overall impression of a mule is that it resembles a horse rather than a donkey, but it has larger and longer ears than a horse and a heavy head. Its tail is more or less covered in long hairs, rather than a donkey-like tassel. The hinny has a lighter head and shorter ears and its tail is that of a donkey. The mule, partly because of its size, is by far the more popular of the two and it has been of great importance in many parts of the world for many centuries.

There are representations of the hybrids in ancient Egyptian paintings dating back to about 1400 BC (Clutton-Brock, 1981) and there have been claims that mules were used in the mining of turquoise in the south Sinai peninsula (an industry that has a history stretching back for at least five millennia): mules appear to be among the animals carved as wall graffiti by miners during the XII Dynasty some 3000 years ago and elsewhere they are often depicted as drawing the chariots of the Pharaohs. The practice of breeding mules dates back to at least 1000 BC in Western Asia and they were known in the Holy Land in the early years of King David (1015–975 BC) (Aubaile, 2012). It was probably in Mesopotamia and Anatolia that horses (originally domesticated in Central Asia by 3500 BC) first spread far enough south to overlap with donkeys and make mule breeding a possibility. Homer was well acquainted with mules in ancient Greece in the 8th century BC and noted their arrival from Henetia (or Enetia) in Asia Minor. Mule breeding was a speciality of Henetia, a district of Paphlagonia on the southern coast of the Black Sea in Anatolia. They were used as draught animals and in farming in Greece and, later, they were bred in Arcadia and many other areas of the Peloponnesus. Harness racing with mules started at Olympia in 500 BC. The Greek word for a female donkey was *muchlos*, the source of the Latin *mulus*. By Roman times, mules had become essential as riding animals, cart pullers, baggage carriers and for ploughing and their remains are found in many parts of the Roman empire in Europe. The agricultural writer Lucius Junius Moderatus Columella (AD 4–70), born in Spain and with farms in Italy, and author of the 12-volume *De Re Rustica*, described in detail how to raise and train a jack for mule breeding, how to encourage a horse mare to accept a jack and how to raise the hybrid foal.

The hybrids, whether mule or hinny, are sterile; they cannot reproduce and thus there are no mule 'breeds'. Male mules are capable of sexual activity and are normally castrated for easier management. Mule production always requires the use of jacks and has encouraged the selective breeding of larger donkeys to provide large jacks. This has been a major factor in the development of donkey breeds, especially in the Mediterranean countries and in the USA. The best-known donkey breeds for mule production include American Mammoth Jackstock, the Poitou and Berry Black of France, Spanish breeds such as Andalusian, Catalan, Majorcan (Balearic) and Zamorano-Leonesa, Italy's Martina Franca, the Maltese, the Cyprus, the Mary of Turkmenistan and Brazil's Brasileiro and Pega.

Mules are generally classified by type, such as pack mule, saddle mule, draught mule or gaited mule. They have been highly valued as military animals since ancient times and were still used in this role in the 20th century: they participated in significant numbers in World War I (by the end of which the British army had 213,000 mules) and continued to be valued to a lesser extent in World War II; and they were also used in much smaller numbers in the Korean War and even for Western combat missions in Afghanistan in the 21st century.

Mules have been US Army mascots since 1899, but the last US Army mules were formally 'mustered out' in December 1956 after about 125 years of service lasting from the Mexican War of the 1840s until World War II (Essin, 2000). During the American Civil War in the 1860s, the Union Army had used about 1 million mules to transport artillery and supplies, though the South was only able to muster half that number, many of which were provided by the soldiers themselves from family farms. In 1940 there were still 3500 mules in the US Army – as many as there had been during the Spanish-American war of 1898.

Mules were valued as 20th century warfare pack-train animals in that they were able to venture into terrain that was impassable for vehicles such as tanks, trucks and jeeps. Pack horses were also used, but mules were preferred where the trails became demanding as they were more surefooted and more hardy. In World War II, to the surprise of many younger US military personnel, the demand for mules increased while the demand for horses rapidly declined. In 1941, for example, 23,500 horses and 4279 mules were procured for war duties; in 1942 the numbers were 2859 horses and 1699 mules; and in 1943, remarkably, only 4 horses but 10,217 mules were procured. In the final two years of the war, no horses were purchased but 5129 mules were acquired in 1944 and a further 9199 mules in 1945, largely to pack supplies to the foxholes, dugouts and gun emplacements of troops in rugged mountain terrain (Waller, 1958). In the 1950s, however, the US military began to use a new Army mule, the 'mechanical mule': this was the M274 Mule, a platform utility vehicle to supplement the Jeep and initially tested as a 'jungle burden carrier'. The mechanical mule, able to carry loads in difficult terrain like its four-legged precursor, became essential during the Vietnam War. There is now a remotely operated 'robot mule', the Multifunction Utility/Logistics and Equipment (acronym: MULE) unmanned vehicle, which can carry enough equipment to supply two infantry squadrons in the field: each vehicle, costing about $300,000 to purchase, can carry about 2000 lb (910 kg). The six-strong teams of four-legged mules used by the US Army in World War I would haul wagons weighing 2000 lb that were loaded with cargo weighing a further 3000 lb – a total pull of 2.7 t.

Muscat *see* Masai
National Genatic *see* Yemeni

Nigerian (*Nigeria*)
Unusually among donkeys worldwide, Nigeria claims more breeds of donkey (12) than of any of its other large livestock, though most sources would reduce this to four. It also has Africa's second highest and the world's ninth highest donkey population at 1.265 million in 2013. However, unlike the Sudano-Sahelian countries, Nigeria's donkey population has reduced a little over the past 50 years: it stood at 1.398 million in 1961. There was a major slump in the country's donkey

numbers in the 1970s, from a combination of oil exploration, the introduction of cheaper motorized transport and good road networks, though in the following decade unstable fuel prices, deteriorating roads and economic hardship began to reverse the trend. More recently, with increasing research into using donkeys to economical benefit, donkey numbers have been rising again in Nigeria and they are used as a means of transporting people and water, accompanying Fulani herdsmen in transhumance systems, carting grain and building materials in more urban areas and, as a newer industry, in the production of meat for markets in the south-east that are absorbing considerable numbers of donkeys bred in the north. A detailed survey (Hassan *et al*., 2013) concluded that donkeys can still play important socio-economic roles in the farming systems of Nigeria and deserve much more attention from livestock policy planners. As well as conveying farm produce to market, fetching deep-well water, providing manure for crops (and for cash), being hired out commercially as pack transport, and providing further cash income from the sale of offspring, donkeys are cheaper to purchase and maintain than draught cattle, easy to train when young, can be used as pack animals (rather than requiring the purchase of a cart) and behave well in urban areas. They are increasingly seen as a means of generating income, rather than simply as draught animals for smallholders.

The main distribution of donkeys has always been in Islamic and semi-arid areas in the north, where most of them were traditionally kept by pastoralists and village farmers (they are susceptible to trypanosomosis in the more humid regions of the south). Some of the villages in the far north specialized in breeding donkeys. It was with the introduction of various types of donkey with trans-Saharan caravans via Sudan and Chad that donkey development began in Nigeria (Blench *et al*., 2004) and there continues to be constant movement of donkeys with pastoral Fulani crossing the border from Niger, Chad and Cameroon – countries in which, along with their other neighbours, donkey breeding is more prevalent than in Nigeria itself (*see* Sudano-Sahelian).

The Nigerian country report to the FAO on its animal genetic resources (2004) indicated that only 30% of the country's donkeys are kept in low-input productions systems (elsewhere in Africa, and in much of the world, the figure is usually closer to 100%); 70% are in medium-input systems. The report also pointed out that the 'jakin Kano' (*jakin* is the Hausa word for donkey and the proverbial phrase '*Ya iya Hause kamar jakin Kano*' means, literally, 'He speaks Hausa like a Kano donkey') is 'almost history'.

The Nigerian 'breeds' are essentially colour varieties of the widespread locally adapted native donkey. The most commonly recognized types, with their names in Hausa, are **Auraki** (rust-coloured or red coat), **Duni** (dark brown to black), **Fari** (white or pale cream) and **Idabari** (grey to light brown). Although there is not necessarily any direct link between coat colour and the productivity or usefulness of the animal, buyers often favour certain colours.

Nordestina *see* Brazilian

Normand (*NW France: Normandy*)
Now conserved by the *Association de l'âne Normand*, this small donkey's ancestors were widely used to carry milk churns in the days when Normandy's dairy cows were milked in the fields. In this role the donkeys could carry the equivalent of their own weight on their backs and would also work in market gardens. At the end of the 19th century there were about 400,000 donkeys in the country but, like other French breeds, the Normand is now classified as endangered: by 1993 it had dropped to 300 when the breed association was formed and it still numbered only a few hundred in 2004. It was officially recognized as a breed in 1997. It continues to be a pack animal but is also used between the shafts to carry baggage on family outings. Its height is in the range 110–125 cm at the withers. The coat is bay or dark bay (grey is not permissible) with a dark dorsal stripe and shoulder stripe, with or without zebra stripes on the legs, and with light (grey-white) points.

North Adriatic *see* Croatian

North African (*Algeria, Libya, Mauritania, Morocco and Tunisia*)
The Maghreb (the land of the Berbers), in the sense of the area that included North Africa's Atlas mountains and the coastal plains to the Mediterranean, was the ancient range for the Atlas wild ass, *Equus africanus 'atlanticus'*, which is thought to have become extinct in early historic times, perhaps by AD 300 (Groves, 1986). Ancient depictions suggest an ass with a shoulder cross and also with leg stripes, but it is also possible that the supposed Atlas ass was in fact a zebra.

The native North African donkey, known in French-speaking countries as *âne commun d'Afrique*, is a general type found in several countries of the Maghreb in the wider sense (including their Saharan regions) and is well adapted to them. There are no characterized local or national breeds but the type is usually grey, or sometimes chestnut, with dark dorsal and shoulder stripes, and tends to be small, perhaps 105 cm at the shoulder. It is a drought-resistant draught donkey. A similar type is seen in the Sahel in Mali and Senegal (*see* Sudano-Sahelian).

Donkey populations in this wider region in 2013 included: Algeria 136,000; Libya 29,000 (a huge decrease from 102,000 reported in 2012); Mauritania 170,000; Morocco 944,000; Tunisia 240,200. Most of these countries have shown substantial increases in donkey numbers over the past 50 years, but Morocco also has 453,330 mules, more than twice the number it had in 1961. Tunisia had 82,200 mules in 2013, Algeria 33,500, but the other countries have not registered any mule populations in the FAO returns. In Libya two types are noted: a smaller variety that is usually bay with light points; and a larger variety that is usually dark bay or grey.

Morocco has a long and noble tradition of horse breeding stretching back more than 3000 years and the animals have strong cultural significance. Horses were also used in times of war, and more mundanely in transport and agricultural work, along with mules and donkeys. In 2005, around 70% of Morocco's agricultural holdings of less than 5 ha used equids of one kind or another. The mule population has grown constantly in recent decades and it is the mule that is preferred as the working animal in Moroccan agriculture. In 1953, a mule breeding station was established in northern Morocco (Meknès) at Ain Jemâa, using Catalan jacks. However, the the herd was dispersed when the station became an AI centre in 1968.

North China (*N China*)
This widespread and numerous type is found in the drainage area of the Yellow (Huang), Huia and Hai rivers. The average height of the North China donkey is less than 110 cm, weight range 130–170 kg, and the donkeys on the plains tend to be larger than those in the mountains. They are used for a wide range of work and also for their meat, which is fine in texture and dark red in colour (dressing percentage 47.7%). The head is fine, the body is compact, the legs are slender and the most common coat colour is grey, but there are also black, white or chestnut animals.

North-eastern *see* Brazilian
Nubian wild ass *see* African wild ass
Ogaden *see* Ethiopian
Omo *see* Ethiopian
Onager *see* Asiatic wild ass
Ossabaw Island *see* American wild burro

Pantelleria (*Italy: Sicily*)
The small volcanic island of Pantelleria, 15 km in length, has been variously occupied over the millennia by Iberians, Romans, Arabs, Sicilians and others. It lies closer to Tunisia on the North African coast than to south-west Sicily, and its indigenous donkey has an African appearance. Its history on the island is said to go back to at least the 1st century BC.

The *asino di Pantelleria*, also known as *Pantesco* (meaning 'of Pantelleria'), is noted for its stamina, surefootedness, speed, ability to withstand extreme conditions (including the island's lack of fresh drinking water), intelligence and lively temperament. Islanders prefer donkeys to horses and the animals are even raced: they are said to attain speeds of 25 km/h and can race over all types of terrain. They have also perfected the smooth and comfortable amble or *tölt* gait seen in Icelandic horses, a lateral rather than diagonal movement with the two legs on the same side moving forward together. The main traditional role of the Pantelleria donkey is as a beast of burden, capable of carrying heavy loads over difficult ground, but they have also been used in mule breeding. They were popular for centuries but now they are almost extinct. In the early 1990s attempts were made to breed the Pantelleria back to the original type by moving the few remaining individuals to San Matteo, near Trapani, with a satellite population in the Zingaro nature reserve. Their status remains critical, with the population in only double figures and said to be as low at ten breeding males and 13 breeding females in 2005.

The average height at the withers is in the range of 125–140 cm. The short fine coat is black-brown to dark bay, with white belly, inner thighs, muzzle and eye rings and a dark dorsal stripe. The head is small, the eyes are large, the ears small and mobile, the neck is long and muscular, the back long and straight, the legs are muscular and sturdy, and the hoofs are strong and do not requiring shoeing.

Paulista *see* Brazilian
Pega *see* Brazilian

Persian onager (*Iran*)
The wild Persian or Iranian onager, *Equus hemionus onager*, also known as *anger* and *ghor-khar*, is a subspecies of the Asiatic wild ass (*qv*) or *hemione* (*half-ass*) and is now critically endangered and almost extinct. It is largely restricted to two isolated populations in protected semi-arid areas in Iran: the Touran (Khar Turan) national park in Semnam province in the north and the Bahramgor (Bahramegoor) protected area in the south on the borders of Fars and Kerman provinces, with its core zone of Qatrouyeh national park. Nowzari *et al*. (2013) observed the natural history of the latter population over consecutive years. The Qatrouyeh national park is an area of mountains (part of the Zagros Mountains) and desert-like plains and the onagers share the reserve with wild sheep, wild goats, gazelles and carnivores ranging from foxes and wolves to leopards. There are estimated to be 270 onagers in the Qatrouyeh national park (Hemami and Momeni, 2013). The animals are capable of running at up to 60–70 km/h in short bursts, or 40–50 km/h over longer periods. They are slightly smaller and paler than other Asiatic wild asses. The average height of males is about 150 cm at the shoulder, weight 250 kg. The coat is pale sandy-red or yellow-brown (greyer in winter) with white points and a brown dorsal stripe.

Peruano (*Peru*)
The Peruvian (*Peruano*) is an ambling donkey that can produce excellent laterally gaited mules, especially when bred to Peruvian Paso mares (a type that was originally developed for work in the plantations). These docile Peruvian mules have a smooth ground-covering gait and were ridden by a squadron under the command of T.E. Lawrence of Arabia during his campaign against the Ottoman Turks in World War I (the Arab Northern Army had a mule-mounted battalion). Peru's increasing donkey population in 2013 was 640,000, plus 307,000 mules (*see* Table 1).

Poitou (*WC France: Poitou-Charentes*)
The *baudet du Poitou*, the first donkey breed to have been officially recognized in France (1884), is the most instantly recognizable of all French breeds. It is very tall, with a characteristically long, thick and woolly coat, often falling in matted cords or *cadenettes* (named after a 17th century aristocrat and originally applied to a military hairstyle of plaits or curled locks, not unlike dreadlocks). The coat colour is usually dark brown to black but sometimes yellowish (known as *fougère*), with light (pale grey) points. The silvery grey muzzle and eye rings have a russet-coloured halo.

The type had apparently been known in the Near East for a considerable time and first appeared in France in the 10th century (some have claimed it arrived with the Romans in 54 BC), mainly for mule production, an industry that flourished particularly from the 13th to 18th centuries in various parts of the world. Eventually the big Poitou donkey would be exported not just to various Mediterranean countries but also to America and parts of Africa, partly to improve local donkeys and partly for mule production. However, like other French donkeys the Poitou donkey population at home dwindled rapidly from the 1950s, with the post-war replacement of mules and donkeys by mechanization.

There had been a mule-breeding industry based on a type identifiable as the Poitou for at least three centuries and it was at its peak locally from the 17th to 19th centuries. At one time it was claimed that the Poitou region bred at least 30,000 mules annually, for home use and for export. In production of the

famously large and hardy Poitou mule, the Poitou jack was mated with a mare (*jument*) of the heavy-boned Poitevin *mulassière* (mule-maker) draught horse of the marshes with which the history of the Poitou donkey is closely linked. In the 18th century, France's national stud farm was breeding cavalry horses and disapproved of mule production in Poitou; early in the 19th century the breeding of mules from mares taller than 120 cm was banned by the government and there was talk of castrating all of Poitou's jacks. Yet in the mid 19th century mule breeding in various regions was thriving, and Poitou's mule sires became famous not just regionally but in other countries as well. Eugène Gayot, in his article '*L'industrie mulassière a Poitou*' (*Journal d'agriculture pratique*, Vol. 2, 1860) explained in some detail that the Poitou jack was a very precious animal, able to fetch high prices and used solely for breeding, never for work, although its physique suggested it would have been an excellent and strong worker. In the best animals the coat was almost to the ground; '*ils sont dit* guenilloux *parce qu'ils resemblent à des pauvres couverts de guenilles*' (i.e. rags or tatters). Further, '*On les voit aussi avec de* cadenettes*, long poils frisés qui garnissent les oreilles et bien* talonnés *ou bien* moustachés*, c'est-à-dire pourvues de long poils laineux tombant des boulets et enveloppant en entier les sabots*' (i.e. *cadennettes* were the long wavy locks of hair covering the ears, while *talonnés*, from the word for heel, and moustached described how the long woolly hair tumbled in tangles and entirely enveloped the hoofs). Gayot defined many other terms that were peculiar to the mule-breeding industry in Poitou: '*Ainsi l'industrie mulassière prend le nom de* mulasse*; l'âne étalon s'appele* baudet*; la jument propre à ce genre de producteur est nommée* mulassière*; la mot* muleton *équivaut à celui de poulain, c'est l'expression générique appliquée à la jeunnesse en général, mais en réserve le terme spécial de* fédon *pour désigner le jeune animal destiné à devenir un baudet, un reproducteur précieux. On di* mulassier *le cheval qui entretient la race des juments mulassières et l'*atelier *est l'établissement où les particuliers conduisent les mulassières au baudet*.' That is to say: *mulasse* was the name for the mule-breeding industry; *mulassière* was used for the mares that were crossbred with the Poitou jack or *baudet* (the latter can mean 'ass' in general, but more specifically indicates the breeding jack); *mulassier* (in the masculine) was used for the males of the mule-breeding horses (remembering that the cross was of donkey jack on female horse, rather than horse stallion on donkey jenny); *muleton* was the equivalent of foal, but the special term *fédon* was reserved for a young male donkey destined to become a *baudet*; and an *atelier* (literally, workshop) was the establishment to which the mares were brought to the jack for breeding. Production was concentrated in Deux-Sèvres department, especially around Melle for the tallest donkeys of the 'precious race' that produced the most esteemed mules. The type had been taken to Spain, but Gayot claimed that it had not been so well bred there, whereas in France it had been scrupulously bred in-and-in. He also said that the Poitou donkey originated from Syria and Palestine.

Further light was shed on the Poitou breeding industry in an article 'The horse and its kin' published in the *Spectator* in 1895 (20 July, p.19). Pointing out that mule-breeding was 'a pursuit which has never gained any footing in this country' and that there was little use of mules in England, though the country did need mules for foreign service, especially in India and some of the colonies, the author said ruefully that 'we are reduced, as a rule, to importing the donkey sire from France or Spain' in the absence of any good jacks in England or Ireland. In the case of Spanish animals, the English and Americans had 'been content . . . to take anything in the shape of a big donkey that the Spaniards have offered us, – generally animals which would not find favour in the Spanish market. Nor can it be said that the Poitou ass represents the result of really scientific breeding, being rather the product of the most curious tradition and prejudice. The account given by the authors [Tegetmeier and Sutherland, 1895] of mule-breeding in Poitou is rather interesting in so far as it shows the weak side of French scientific farming, – the universal predominance of custom over common-sense. Not only do they subject the mule progeny to a treatment which is the most likely to be injurious to its early growth, but they also select the donkey sire according to rules which are perversely capricious. One of the chief desiderata in a Poitou "Jack" is a rough coat, an inheritance of the very least profit to his children and a very doubtful boon to himself – "From the day he is born to the day of his death no brush or comb is ever allowed to be used on him; and as from the unnatural condition in which he is kept he is prevented in a great measure from shedding his coat, the functions of the skin become suspended, and the animal gradually assumes year after year an accumulation of coats, all matted together with stable filth, till at length they almost trail on the ground! When he has assumed this extraordinary and bear-like appearance, he is pointed to with no little pride by his owner, and is termed *bourailloux* or sometimes *guenilloux*. Such is ignorance and prejudice!".'

Other writers of the time noted that not only were the jacks confined to their stalls throughout the year; it was also believed that the covered mares should be underfed in order to produce colts rather than fillies, which were less valuable, and that foals should be denied colostrum. Yet the French were considered to be unrivalled as mule-breeders in the late 19th century.

In 1884 a stud book was created for the Poitevin horse, with a section for the Poitu donkey as well, and the government ceased to interfere in mule breeding. The aim was to breed the Poitu *baudet* selectively for the production of heavy draught mules and it became the first donkey breed to be recognized officially in France. By the late 19th century Poitou mules were in high demand in the USA and would continue to be so until World War I. In 1902 there was, briefly, a breeding syndicate to promote Poitou mules. In 1912, finally, the French government began to support the mule breeding industry, including for use by the army, and the national stud was purchasing mules. In the 1920s, mule breeding in Poitou's Deux-Sèvres region became centred in *ateliers* and during the first half of the 20th century the industry began to collapse in the face of competition from mechanization. The Poitevin horse quickly fell out of favour for anything other than meat production, if that, and by the 1990s the horse breed was almost extinct until France's national stud stepped in. The stud book for the Poitevin horse (*Trait Poitevin Mulassier*), the Poitou donkey (*Baudet du Poitou*) and the Poitou mule (*Mule Poitevine*) is currently managed by the national *Association des Races Mulassières du Poitou*.

The standards for the *baudet du Poitou* specify a coat colour of *bai foncé, pouvant parfois aller jusqu'à la nuance "fougère", avec le pourtour de la bouche, du nez et des yeux gris argenté bordés*

d'un auréole rougeâtre; l'animal ne doit jamais être rubican (*à robe semée de quelques poils blancs*) *ni porter de raie de mulet* (*bande noire longeant la ligne dorsale du garrot à la queue*)*; le dessous du ventre et l'intérieur des cuisses sont très clairs*. That is to say, the coat should be dark bay, sometimes with a hint of 'bracken', with silvery grey around the mouth, nose and eyes bordered with a russet halo; the coat must never be '*rubican*' (with scattered groups of white hairs) nor should it have a mule line (black dorsal stripe from withers to tail) or shoulder stripe or cross; the underside of the belly and the inner thighs are very pale grey. The average height at the withers is 145/140 cm, with a range of 135–156 cm for males (weight range 350–450 kg). The bone structure is massive and the breed is known for its strength. The head is heavy and long, the long open ears are furnished with long hair, the neck is strong, the back long and straight, the haunches slightly projecting, the rump short, the thighs long and muscular, the ribcage rounded, the legs powerful with broad joints, the feet broad and covered with hair. The coat of the female is sometimes less abundant than that of the male, but jacks are prepotent in passing on the characteristic coat to their offspring; it is said that an animal with only one-eighth Poitou blood will still resemble the purebred in its shaggy coat. In the past there were those who implied that the long coat conveniently hid any defects.

The coat is sometimes described as *bourailloux*, possibly implying the stuffing of a cushion (*bourre*) or connected with the word *bourrique*, one of many French terms for the donkey in general. *Bourailloux* is applied specifically to animals that have deliberately never had their coats trimmed since birth, so that they become matted, corded and very long. Another term is *guenilloux*, which infers a tattered garment or old rags, as mentioned above.

From its original breeding area in the Melle region in Deux-Sèvres, the Poitou spread to many parts of France and to a wide range of other countries as well, such as Russia, North and South America, North Africa and the old Belgian Congo. Yet in 1977 it had become extremely rare in its own country, with no more than 44 of the breed remaining. After World War II, donkeys and mules in general had become redundant in the face of agricultural mechanization and motorized transport and it appears that many Poitou donkeys were slaughtered for meat. Between 1949 and 1977 the recorded number of male donkeys in Poitou had fallen from 218 to 12 and the females from 340 to 13, and stud book registrations had dropped from 125 to only 7. There were also concerns about fertility: in 73% of recorded services, the females either returned to service or aborted; and one-third of the foals born were dead at birth.

A meeting of concerned individuals and groups took place in 1979 at the Paris headquarters of the French National Stud (*Haras nationaux*). In addition to the national stud, those involved included breeders' syndicates, the interregional park authority of the Poitevin marshes (*Parc Interrégional du Marais Poitevin*) and various local and regional groups. They agreed to count and identify (by electronic chip) all animals known and indexed under the name of *baudet du Poitou*; to open a Book B index of crossbred animals in addition to the Book A register of purebred animals; and to create (from 1980) a national experimental donkey farm (*asinerie*) at La Tillauderie, Dampierre sur Boutonne, in Charente-Maritime, where the national stud, the regional park of the Marais Poitevin and the breeders would conduct a programme of continuous crossing and genetic improvement to rescue the breed. The farm would also become a site for the conservation of the animals and the traditions as well as a place for breeding the donkeys and for mule breeding.

Breeding research took place from 1982 at the Tillauderie *asinerie*. For this purpose, 18 large Portuguese female donkeys were acquired for crossing with purebred Poitou jacks in a carefully managed breeding programme in which the female crossbred offspring were backcrossed to purebred jacks. By the 7th generation, this resulted in offspring that were 99.2% Poitou. The conservation programme continues and numbers are slowly increasing.

In 1988 veterinary surgeon Jacques Fouchier, former minister for agriculture and Senator des Deux-Sèvres, created SABAUD (*Association de sauvegarde du Baudet du Poitou*). A census of purebred Poitou donkeys throughout Europe in 1992–1994 found that the population was three times greater than it had been 15 years earlier. In 1995 there were more than 200 Poitou donkeys, divided equally between the genders. In 2000 an organization named UPRA was founded to oversee the management and promotion of breeding Poitou mules. In 2001 a planned *Parc Interrégional du Marais Poitevin* breeding programme was put in place to limit the unhealthy effects of crossbreeding and to research the use of artificial insemination worldwide for the breed. In the same year a Poitou embryo, conceived by artificial insemination, was implanted into a surrogate mare in Australia and a healthy female foal was subsequently born, one of only three purebred Poitou donkeys in Australia at the time. In 2002 the Tillauderie *asinerie* was restored and the Park authorities established a museum devoted to the Poitou donkey and mule. In 2012 there were 174 Poitou breeders in France, with 85 active breeding jacks, 382 breeding females and 169 births that year.

The Poitou was never considered to be a working donkey: its role had always been to breed mules, but since the turn of the century a few of this rare breed have been trained as harness, pack, riding or draught animals, essentially for the tourist industry. It is interesting to note that the Donkey Sanctuary in Exmouth, England, after joining SABAUD in 1986 and importing three purebred Poitou donkeys (one male, two females) through a sister charity in 1988, found later that the leg-bone structure was not strong enough for the type of work envisaged and that the Poitou appeared to be prone to congenital weakness of the spine and hips.

There is another role for the Poitou on the **Ile de Ré**, just off France's Atlantic coast near La Rochelle, in the Charente-Maritime department in the Poitou-Charente region. The island, now a popular holiday destination, is noted for a long tradition of harvesting sea salt from its salt marshes. The donkeys that helped with this harvest and with gathering kelp as a field fertilizer, or worked in the fields, were traditionally dressed in leggings or 'trousers' (strips of old material, often checked or striped, covering all four legs) to protect them from biting insects. Today tractors are used rather than donkeys but the 'trousers' tradition is continued as a tourist attraction, typically with the donkeys giving rides to children. Most of the donkeys are the Poitou and their role is to raise funds as part of the campaign to save the breed.

Ponui (*New Zealand*)
There is a feral herd of donkeys on New Zealand's Ponui Island in Hauraki Gulf, to the east of Auckland. They are descended from three animals imported from Australia in the 1880s by the Chamberlin family, who had owned the island since 1854. The donkeys are sturdy and docile and are usually light dun to white (or occasionally chocolate) with a dark brown dorsal stripe, and stand about 9–10.2 hh (91–107 cm) at the shoulder. Most have been brought to the mainland in recent years and enthusiasts are trying to build up a genetically pure population. There is a Ponui Island donkey register, organized by the Donkey & Mule Society of New Zealand, to record as many pure island donkeys as possible for this rare breed, now scattered throughout the country with only a few remaining on the island itself (and these do not appear to breed readily). The rules for registration are that the donkey must be able to be traced to 100% Ponui Island stock; it must not be broken coloured; and it must not have any known infusion of any other blood. The Ponui is also sometimes known as the *New Zealand* donkey.

Porro *see* Sudano-Sahelian
Primorski dinarski magarac *see* Croatian

Provence (*SE France*)
In the 15th century, donkeys in Provence were widely used by shepherds in the ancient transhumance system that moved sheep flocks seasonally between the plains and the high mountain pastures. Thus synonyms for the local donkey include *âne de transhumance* and *âne de berger* as well as *âne d'Arles*, *âne de la Crau*, *âne de Savoie* and *âne gris de Provence*. For nearly five centuries the donkeys continued to have an essential role in transhumance, carrying equipment, food for the shepherds, salt for the ewes and sometimes lambs that had been born during the migrations. The Provence donkey was selected for a strong bone structure to carry these heavy loads, good legs and feet for difficult terrain and a docile temperament. The coming of the railways and mechanized transport rapidly undermined the role of the Provence donkey, and numbers dropped from about 13,000 at the end of the 19th century to about 2000 in the mid 1950s and only 330 in 1993, at which stage steps were taken to save the breed. The combined efforts of *Haras d'Uz* (*haras* = stud farm; Uzès is in the Languedoc region, Gard department) and the *Association de l'âne de Provence* (AAP) increased the population to around 1500 and the Provence donkey began to spread to other regions. New stud book registrations are in the region of 75–100 annually.

These solidly built rustic donkeys remain surefooted, strong boned, docile, patient and easy to train. The coat is typically *gris tourterelle* (*reflet rosé*) – turtledove grey – but may range in tone from uniform very pale grey to uniform dark grey, with light points and always with a well marked *croix de St André*. The head is quite large, with a broad pale muzzle and almond-shaped black-ringed eyes, the edges of which, along with the medium-length ears and forehead, are almost always russet-tinted. The strong-boned legs may be marked with 'zebra' stripes. The neck is thick and strong, the back is strong and straight, the feet are relatively large and the height at the withers is in the range of 120–135/117–130 cm. The Provence is now used in trekking and for scrub clearance; and is still used in transhumance shepherding systems as a pack, riding and draught animal.

Puttalam (*NW Sri Lanka*)
Known locally as the Puttalam *buruwa*, this population of feral donkeys is found on Mannar island (in Northern province) and Kalpitiya peninsula in the Puttalam district (in North-west province). Some say they are descended from donkeys introduced long ago by Arab traders, who first arrived in the 7th century, or perhaps by the Portuguese in the early 17th century and that the animals were liked locally because of the belief that the smell of donkey manure deterred insects that attacked coconut plantations. The Puttalam donkeys are usually light grey, though some are brown or black. They are sometimes seen roaming the streets in the island town of Mannar, where they are both a tourist attraction and a hazard: they are killed or injured in traffic accidents, and tend to devour garbage when starving. A census in 2012 estimated that there were about 300 donkeys at loose in the island town and a total population of about 1000 in Mannar.

Pyrenean (*S France*)
The donkeys of the Pyrenean mountains are a combination of local French and Spanish types such as du Béarn, de Balagué, Lourdais, Tarbais, de Tournay and, south of the border, those of Vic and Urgell in Spain's Catalonia. There are two main types of Pyrenean donkey in France, the **Gascogne** and the **Catalan**, differing most obviously in size and recognized jointly in France since 1997 by the government and by the National Stud (*Haras Nationaux*) under the name *âne des Pyrénées*. The sturdy Gascogne type stands at 120–135 cm, whereas the more elegant and finer-boned Catalan is at least 135 cm at the withers (*see also* Catalan, as a Spanish breed).

Pyrenean donkeys are versatile: they were well adapted for transport and farm work in their challenging environment, and were at their height of popularity in the 19th century. Mechanization rapidly reduced their numbers from the 1950s but they are still used as pack, harness or saddle donkeys and in mule breeding, and their milk – a traditional product in the Pyrenees in the 19th century – is now used in the cosmetics industry. The surefooted, calm and gentle Gascon is used as a pack donkey for trekkers in the mountains; it is easily able to carry a load of 25 kg for 6–8 h at an elevation of 1500 m. The larger Catalan tends to be used for cart pulling and for mule production: the males are typically bred with Breton, Percheron or Merens Castillonaise mares, or even with Anglo-Arab mares. The APY (*Association des eleveurs d'ânes des pyrénées*), established in 1994, aims to safeguard and develop mules as well as donkeys in the Pyrenees: mules were added to APY in 2004 and it is now known as *Association des eleveurs d'ânes et mulets des Pyrénées*.

The current risk status of the Pyrenean is critical: in 2004 there were fewer than 100 breeding animals in the stud book, though numbers have slightly increased since then, and there is a conservation programme through the APY. They remain useful on steep terrain where mechanization and vehicular access are difficult or impossible; and the surefooted Pyrenean pack donkey is ideal for trekking in the mountains.

The breed standards apply to both types, apart from size. The colours of the short coat are black to dark red or brown, with light points. The body is narrow, the facial profile may be straight or concave, the upright ears are long and thin and

the legs are fine. In character, the Pyrenean is described as lively and alert.

The range of the Pyrenean donkey is in Aquitaine (Gironde, Landes, Pyrénées Atlantiques, Lot et Garonne), Midi Pyrénées (Hautes Pyrénées, Gers, Ariège, Haute-Garonne, Tarn et Garonne) and Languedoc Roussillon (Aude, Pyrénées Orientales, Hérault) and there are also a few in the Limousin region.

Qaramani *see* Yemeni

Qinghai (*NW China: E Qinghai*)
The Qinghai donkey is found in four of the Tibetan autonomous prefectures in eastern Qinhai province, namely Haidong, Hainan, Haibei and Huangnan. It is small (height 105/102 cm, weight 138/136 kg) with a square-shaped body (length 106/103 cm) and is usually grey, but might also be black or blue. It is a pack animal, with a maximum carrying capacity of 680 kg, and is also used for meat (dressing percentage 47.24%). The Qinghai is particularly noted for its tolerance of pain, its low feed intake and its disease resistance.

Qingyang (*NW China: SE Gansu*)
Qingyang prefecture is in the extreme south-east of the province of Gansu, virtually surrounded by the neighbouring province of Shaanxi. The Qingyang donkey is found in the counties of Heshui, Zhengning, Ning and Zhenyuan and is usually black. The average height is 113–114 cm and it is described as having a square-shaped body of large size. As a pack animal it is capable of walking up to 40 km a day.

Qirmani *see* Yemeni
Qubressy *see* Jordanian

Ragusan (*Italy: SE Sicily*)
The *asino Ragusano*, named for the Sicilian province, is one of Italy's several very rare donkey breeds that are close to extinction: it has been registered as endangered since 1990 and the total population in 2005 was 344. Sicily's other donkey breeds are the Pantelleria (*qv*) and the Sicilian Grey (*qv*). The Ragusan is a recent creation: it originated from the Istituto di Incremento Ippico di Catania's carefully planned crossbreeding of local Sicilian donkeys with Pantelleria and the Martina Franca (*qv*) of Apulia and to some extent also with the Catalan (*qv*). The breed was officially recognized in 1953. One of its characteristics is the ability to withstand the colder climates of northern Europe. The main uses are as a pack, draught and military donkey and for mule production, and, as one of the larger breeds, the Ragusan and its mule are also being investigated seriously for dairy production. (Incidentally, the Italian word *soma*, often used in descriptions of roles for donkeys and meaning load or burden, is also seen in the Italian term *somaro*, meaning ass or donkey.)

The coat is dark bay in colour, with pale grey underside and inner thighs, pale muzzle and eye rings with tan edges, black mane and tail; average heights 138/130 cm. The population in 2007 was about 1300.

Rifawi *see* Sudanese
Riff *see* Sudanese

Romagnola (*NC Italy: Forli province, Emilia-Romagna*)
The *asini Romagnolo* is found in southern Emilia-Romagna, especially in the province of Forlì-Cesena, but is endangered. In 1941, there had been 46 Romagnola males used for breeding mules. After World War II the popularity of the donkeys was reduced by increased agricultural mechanization combined with depopulation of the rural uplands, leading to a reduced demand for mules, especially from the 1970s onwards. A conservation programme was started in 1996 by the Forlì-Cesena-Rimini provincial breeders' association but by 2001 the total population was only 51. In 2006 the Romagnola was recognized by the ministry of agriculture as one of Italy's seven breeds of donkey and by the following year the population had increased to about 150 (including 30 breeding females). Breeding, selection and conservation are now supported by AsIRARA (*Associazione Italiana Allevatori di Razza Asino Romagnolo*) and a stud book and standards are maintained by the AIA (*Associazione Italiana Allevatori*). By 2012 there were 500 registered animals.

The Romagnola is a powerful draught and pack animal, with a strong constitution and a lively, willing and reliable nature. It is able to keep up a good pace over long distances. Its height range is around 135–155/130–145 cm. The fringed ears are of medium length and upright and the short smooth coat is either *sorcino* (mouse grey) or dark bay (also bay, blackish or chestnut). The *sorcino* colouring is wild-type ash-grey or lead-grey with black dorsal stripe and shoulder stripe, black mane and tail switch and with leg stripes, especially on the front legs; it has a dark-tipped white muzzle, pale eye rings, white hair inside the dark ears and white throat; the abdomen is white with a dark line along its length. The dark bay type is burnt brown in colour, with pale muzzle, eye rings, throat and underside and a black mane.

Sant'Alberto is probably a synonym for the Romagnola: the distribution of this type in the Emilia-Romagna region is in the province of Ravenna. The village of Sant'Alberto in the Po Delta regional park is not far from the Veno del Gesso regional park's medieval town of Brisighella, in the hills of Romagna, which is famous for its *Via degli Asini*, or Donkey Alley, a unique elevated and covered village street along which donkeys used to draw carts laden with gypsum excavated from local quarries. The street, lined with numerous arches, was inhabited by carters living on either side in rooms dug into the chalk, with the donkeys housed below them at street level.

Another donkey in the Emilia-Romagna region is the **Argentato di Sologno**, a local population in the mountain village of Sologno (part of Villa Minozzo in the far south of Reggio Emilia province). The donkey is noted only for its 'silver' (*argentato*) or grey coat; its numbers are very low indeed and it can hardly be classified as a breed, more a local group selected for a preferred coat colour. Sologna describes itself as 'the village of the sun, leading to the Tosco-Emiliano Apennine National Park', and local photographs taken in the 1930s often featured the village's pack donkeys carrying everything from firewood to chestnuts, lime for the kilns, poles, brushwood, water, flour, wool, provisions and other commodities along the stony mountain tracks; they were also often ridden. The mountainous national park spans the forested ridges of the regional border between Emilia and the Tuscany province of Lucca, in which the town of Querceta has held famous and colourful annual donkey-race festivals since 1956. The event is known as *Palio dei Micci* (*micci* is the local vernacular for ass; they also hold a *Miccio Canterino* singing festival) and the ridden donkeys are 'raced' over a 2000 m circuit.

Romanian (*Romania*)
Romania (once Walachia) has strong historical connections with the Balkan countries. Its extreme north-eastern region is now Moldova, which is the eastern part of Moldavia. Romania has very long history of pastoralism and in particular transhumance: for many centuries its sheep flocks and their shepherds have migrated seasonally, especially in the Carpathians where the flocks move between summer alpine pastures and wintering on the plains. A third of Romania's animal production is in the mountains and high uplands, where the use of mechanized agricultural equipment such as tractors is almost impossible. Draught animals continue to have a role in such areas, but traditionally oxen were favoured until the 20th century, when horses took their place.

It is said that donkeys were originally brought into the region by Roman settlers in the 2nd or 3rd century. In the mountains, shepherds used donkeys as pack and saddle animals and continue to do so, though most peasants do not like donkeys (they are seen as a sign of poverty), whilst admitting their great usefulness. In rural areas donkeys also pull carts, though in 2007 a law was introduced banning donkeys (and horses) from the roads. Donkeys form only 3% of the country's draught animals; they are far outnumbered by locally adapted horse breeds (90%) and even by buffalo (5%). Romania produces several thousand tonnes of horse and donkey meat annually, though FAO statistics are not shown for donkey meat.

The official FAO statistics give a total donkey population of 30,000 for 2012 (no mules are recorded) and the same for 2000. Unusually in Europe, this actually represents a slight increase over the past five decades: in 1961 there were 27,000 donkeys.

There has been very little, if any, scientific interest in Romania's donkeys nor any attempt to characterize them or to recognize local varieties: they are all simply a single 'breed', the native Romanian donkey, or *magarul Romaneasc*. They are similar to the Balkan (*qv*) and usually grey; some individuals are silver, black or occasionally white. The Moldavian local (*Moldoveneasca localá*) is similar; the donkey population in 2013 was about 2400.

Saeidi *see* Egyptian
Sahel *see* Sudano-Sahelian
Saidi *see* Egyptian
Salibi, Al- *see* Jordanian
Sanfen *see* Dezhou
Sant' Alberto *see* Romagnola

Sardinian (*Italy: Sardinia*)
The *asino Sardo* has numerous Sardinian synonyms that effectively simply mean donkey, such as *Ainu* and *Poleddu* (in Barbagu and Goceana), *Burriku* (or *borricu*) with Spanish connotations in the south, *Molente* (or *Molenti*, *Monlingianu* or *Pegus de Mola*) connected with its traditional role in grinding flour, and so on; there are many other names for donkey in Sardinian. It is also called the *Sardo Grigio Crociato* (Grey Sardinian Crusader's donkey, for its characteristic shoulder cross) and *Sardinian Dwarf*, as its height is only 80–110 cm at the withers. It appears to be ancient in origin, with close African connections, and well adapted to local conditions on a large island where sheep are ubiquitous and where horse breeding is famously a centuries-old art.

Despite its small size, the Sardinian is a draught and pack animal and uses in the past have included ploughing, pulling boats, carrying heavy sacks of salt, transporting water and wood as well as often providing the power for turning millstones to grind flour. It was once ubiquitous, but with increasing agricultural and transport mechanization its numbers have been dropping rapidly since World War II and there are now a few hundred rather than the 38,000 or so of the 1960s. However, the Sardinian and the equally small Sicilian have jointly become popular in North America as the *Miniature* (*qv*) or *Miniature Mediterranean*, and might now number as many as 20,000 or more in the USA, whence seven Sardinians were first imported in 1929. A small population is maintained at the Centro di Foresta Burgos by the Istituto Incremento Ippico della Sardegna to conserve the breed.

The coat is mouse-grey, with pale points, and there is the typical dark dorsal stripe (*riga mulina* in Italian) and shoulder cross (*crociata*). The ears have dark borders, the abdomen is pale and the pale legs are sometimes striped. The head is heavy and square, with a straight profile and long upright ears. The neck is short, the legs are robust and the hoofs are hard and small.

The other Sardinian donkey is the very rare and very small white Asinara (*qv*).

Sëng *see* Sudano-Sahelian
Sennar *see* Ethiopian
Serbian *see* Balkan

Shanbei (*NW China: N Shaanxi*)
The province of Shaanxi is home to several donkey breeds, including the Jiami (*qv*) in the north (Yulin prefecture) and the central Guanzhong (*qv*). The Shanbei is found in the northern prefectures of Yulin and Yan'an; it is named for the Shanbei region, which incorporates all of Yulin and most of Yan'an. Shanbei is in the middle of the once-fertile Loess Plateau, an extensive dusty area in which the silty soil became highly prone to erosion and desertification. The climate is semi-arid to steppe.

The Shanbei donkey is about 106 cm in height (male and female) and has a large head, long ears, small eyes, a large abdomen and large hoofs. It is usually black, or grey with dorsal and shoulder stripes, or pinto (i.e. spotted). It is a riding, draught, pack and milling animal.

Shing(h)ari *see* Central Asian
Sibiani *see* Yemeni

Sicilian Grey (*Italy: Sicily*)
Sicily is home to three donkey populations: the Pantelleria (*qv*), the Ragusan (*qv*) and the *Grigio Siciliano* or Sicilian Grey.

Commonly known as *Ferrante* for its iron-grey colour, the Sicilian Grey is believed to have a long history (Liotta and Chiofalo, 2005). Professor Nicola Chicoli (Chicoli, 1870) referred to two types of donkey in Sicily: the *Siciliana*, a small common type used for agricultural work and transport, with a variable coat but always white on the undersides; and the Pantelleria riding donkey that was found only in the stables of the aristocracy (Pantelleria is a small Sicilian island lying closer to the North African coast than to Sicily itself). Mascheroni (1927) described the Sicilian as small, grey and lacking in elegance and mentioned two sub-races: that of the eastern

provinces being similar to the Pugliese or Martina Franca (*qv*); and that of the western provinces being similar to the Pantelleria (*qv*).

The Sicilian Grey is a hardy and frugal type, well able to forage and take care of itself. Its average height is now 124 cm, though in the 1920s its height was given as 132–135 cm and its other dimensions had been proportionately larger as well. It is grey with pale points and black mucosae. As well as being a traditionally hard-working and tireless donkey, it has been assessed for milk production at the University of Messina, where yields of 1100 ml per milking (with three milkings per day) have been obtained. However, the population is critically low at about 100 on the island, or possibly far fewer; thus the hardy and well adapted working Sicilian Grey is on the verge of extinction.

Sinnar *see* Ethiopian
Sirou *see* Sudano-Sahelian
Sjeverno jadranski magarac *see* Croatian

Socotra Island (*Yemen*)
In the Indian Ocean, some 150 miles east of the Horn of Africa and 235 miles from the coast of southern Yemen, lies the extraordinary and isolated archipelago of Socotra, or Soqotra. It is now part of Yemen after a chequered past in which it was visited by sailors of many nationalities as part of the Indian Ocean and Red Sea trade network over many centuries. In the 16th century it was briefly a Portuguese base, and equally briefly in the 19th century a British base (it was also for some years a British protectorate). The climate is tropical desert and semi-desert but, despite high temperatures and drought, it is home to a huge and diverse number of endemic species of flora and fauna. It also has (or had) feral populations of several introduced domestic species, such as cats, goats and water buffalo, and herds of 'wild ass' claimed by earlier naturalists to be the Nubian wild ass (some said the original animals were introduced to Socotra by the ancient Egyptians) but now considered to be feral descendants of domestic donkeys imported perhaps several centuries ago. The donkeys are present in considerable numbers on the plains of Socotra, which have been grazed for millennia by seasonally migrating livestock.

Somali (*Somalia, Ogaden and Kenya*)
Despite its name, the critically endangered Somali wild ass (*see* African wild ass) is only found in tiny numbers in Somalia itself, if at all. Its range within the country used to stretch from Meit (Maydh) and Erigavo in the north to the Nugaal Valley (in which it has been proposed that a Las Anod national park should be earmarked to protect the remnants of the wild ass), and as far south as the Shebele River (IUCN Red List). In the early 1950s it was described as a beautifully shaped grey animal, standing from 12.2 to 13 hands (127–132 cm, larger than the Nubian wild ass), with dark bars on the legs but no stripes on the back or shoulders, and it was found in Somaliland.

Perhaps ironically, Somalia has 6.2 million camels but only 22,000 domestic donkeys and 22,000 mules (FAO statistics, 2013). The camel is the main dairy animal throughout the country, hence its great popularity. In Somalia's country report to the FAO on its animal genetic resources in 2004, the donkey was only mentioned in terms of its numbers; there was no description of its role, its distribution or its type. It is a typical grey donkey but, colour apart, it has not been characterized. Somalia forms the tip of the Horn of Africa and the Somali donkey is also found in Kenya (*see* Masai) and across the Gulf of Aden in Yemen. It is similar to the Toposa (*see* Sudanese).

Somali wild ass *see* African wild ass
South Shanxi *see* Jinnan

South-west China (*SW China: W Sichuan*)
The Tibetan autonomous prefecture of Gârze forms most of western Sichuan province along its border with Tibet. The neighbouring prefecture, in north-west Sichuan, is Ngawa (or Ngaba), which includes the county of Aba. The South-west China donkey is found in both of these prefectures and is used as a draught animal and for fine-textured meat of good quality. It is a very small and compact donkey, only 90 cm at the shoulder and around 85 kg in weight – even smaller than the Tibetan (*qv*) and Yunnan (*qv*) in neighbouring provinces. It has a broad long head and strong legs and the coat is usually grey or chestnut.

Southern Africa (*Botswana, Lesotho, Namibia, South Africa, Swaziland and Zimbabwe*)
There is little definite information about the origins of donkeys in southern Africa, though they appear to have been brought in initially by sea rather than overland. Light-coloured Muscat or Arab donkeys might have been brought into Tanzania from the Gulf region or from Egypt but there is no documented evidence of this. Donkeys were supposedly first imported into South Africa in 1656 (a few years after the introduction of draught horses and oxen), with Dutch settlers using them to draw wagons on long treks and also as pack and draught animals on the farm; they subsequently spread thence into Namibia as the settlers began to move there in the second half of the 18th century, and with various white settlers from other countries (e.g. Germany) during the 19th century. In 1689, Persian donkeys and mules are said to have been landed at the Cape by the Dutch East India Company, but little is known about their history thereafter, though it is likely that they were spread into the interior by Boer farmers. Donkeys were described as already being present among the Shona populations in the Zambezi Valley in 1758 and it has been suggested that they were brought into north-east Zimbabwe from Mozambique along the gold routes (Blench, 2000).

In contrast to the substantial donkey populations in eastern Africa, especially Ethiopia, numbers in the southern countries are lower, though in 2013 there were 341,000 donkeys and 3200 mules in Botswana and they were still increasing. The total for all of southern Africa in 2013 was 776,300 donkeys and 27,000 mules. In the rest of the region in the same year there were, in descending order, 182,000 donkeys in Tanzania, about 155,500 donkeys and 15,000 mules in South Africa, 140,000 donkeys and 6700 mules in Namibia, 130,000 donkeys and 2500 mules in Lesotho and 112,000 donkeys and 1225 mules in Zimbabwe, according to FAO statistics; elsewhere there were fewer than 20,000 donkeys in any one country. The numbers are not necessarily reliable, and the changes are often as much political as practical, but trends appear to have been sharply upwards for Botswana (from only 24,000 donkeys in 1966) and Lesotho (42,000 donkeys in 1966), Namibia (53,000 in 1966), a more

gradual increase in Zimbabwe and a continuing drop in South Africa (from 310,000 donkeys in 1966 and 0.9 million in 1937), a decline that could be partly put down to large-scale white farmers ceasing to use donkeys in the 1940s and 1950s and the official discouragement or outright banning of the animals in much of the country. The South African reports can be puzzling: the FAO returns remained constant at 210,000 throughout the 1980s and 1990s, although to observers donkeys continued to be widely used.

Whatever the population figures, none of the countries of southern Africa has produced any donkey breeds, though a **Tswana** 'breed' in Botswana is described as a large draught animal with a black or grey-brown coat (less often, white), the population of which had dropped from 158,000 in 1990 to 40,400 in 1999.

Spanish (*Spain*)
Several Spanish donkey breeds are of the large type and are widely used for mule breeding. Spain is unusual in that, in 1961, it had many more mules (a population of nearly 1.16 million) than donkeys (about 686,000), according to FAO statistics. However, mainly due to rapid agricultural mechanization during the 1960s and 1970s, the number of mules had already been reduced to about 352,000 and the number of donkeys was about 280,000 by 1974. By 2013 those numbers had fallen further to only 110,000 mules and 142,000 donkeys, but Spanish genes are widespread: Spanish donkeys have been exported in good numbers over the centuries, especially to Latin America (*qv*) from the early years of its colonization.

The typical unimproved native donkey in Spain is referred to as *Común* and its small black varieties are sometimes called *Moruna* (which translates as Moorish, i.e. dark). The common donkey might also be known as *burro Castellana* or *Castilian*. Spanish donkey breeds are broadly divided into those of the north, which are generally black, and those of the far south and the islands. There are six breeds or groups, most of them now numbering only hundreds. The northern breeds include those close to and in the Pyrenees: the big Catalan to the east and the smaller Las Encartaciones in the Basque country to the west. There is also the large Zamorano-Leonesa in the western provinces of Zamora and León, in the north-western region of Castile & León. The island groups include the large Balearic donkeys (in particular, the Mallorquí or Majorcan) and the smaller type of the Canary Islands (the Majorero). In southern Spain, the large Andalusian has close affinities with the African donkeys of Morocco, just across the Gibraltar straits, and several authors have suggested that both are derived from the Nubian wild ass rather than the Somalian (Aranguren-Mendéz *et al*., 2001, 2002). *See* separate entries for Andalusian, Balearic, Catalan, Las Encartaciones, Majorera and Zamorano-Leonesa.

Sperki *see* Central Asian
Spotted *see* American
Standard *see* American

Subei (*E China: N Jiangsu*)
The Subei people are from northern (*bei*) Jiangsu province and they migrated southwards in large numbers into Shanghai in the early decades of the 20th century. The Subei donkey is the easternmost of China's breeds: it is found in northern Jiangsu's Xuhuai district. Its coat is usually described as 'blue', though it may also be grey or black. It is a small-bodied pack donkey, capable of maintaining a speed of 40–50 km a day for up to 5–7 days carrying 85–90 kg. The average height is about 106 cm, weight 112 kg.

Subyani *see* Yemeni

Sudanese (*Sudan*)
Sudan is a large country, bordered by nine other African states. Its environment ranges from desert scrub in the north, with a hot dry climate, through the savannahs of the African Sahel zone in the centre, to the equatorial region of the south with its humid subtropical woodlands and dense plant cover. The national economy depends heavily on agriculture and some 80% of the population are engaged in animal husbandry and crop production. Overgrazing by nomadic and sedentary livestock has resulted in increasing desertification.

The donkey population in Sudan was 590,000 in 1966. By 2013, according to FAO statistics, the number of donkeys had grown in former Sudan to 752,000 and there were also a few hundred mules (there were no separate returns in 2013 between the Republic of Sudan and South Sudan, which became independent from former Sudan in 2011). The northern part of Sudan is the Nubian Desert and donkeys were historically used for long-distance desert caravans before the introduction of camels. They continue to be used for such purposes today: for example, Förster *et al*. (2013) recorded interviews with drivers of a donkey caravan in north Sudan travelling some 900 km from the Debba Bend of the Nile to El-Fasher in Darfur, where they intended to sell the donkeys. Such a journey would take about 20 days. Most of the donkeys in this modern caravan were not loaded but a few were being used as pack animals or were being ridden by one of the drivers.

Donkeys remain essential in Sudan. They are used to pull carts carrying all manner of goods and possessions; they draw water carts and garbage carts; they are used for ploughing; they are ridden or used as pack animals; they deliver supplies and medical assistance to refugees and the dispossessed, and are used as ambulances. Their presence in the country is notable, in urban as well as rural areas.

There are two main groups, the Sudanese Pack and the Sudanese Riding, but most Sudanese donkeys are non-descript and so severely worked that injuries and deaths are frequent. Sudan's *Third National Report on the Implementation of The Convention on Biological Diversity*, published in Khartoum in 2006, noted that the majority of the country's livestock types and breeds were mostly raised within tribal groups and often carried the names of the tribe or locality. The report listed five donkey breeds: Dongolawi, Etbai, Rifawi, Sudanese Pack and Toposa.

The **Toposa** tribe in South Sudan are well known for their donkeys, which are similar to the grey Somali. The **Sudanese Pack** is similar to the Abyssinian (*see* Ethiopian) and is usually grey. It is also known as *Dubbolawi Makadi*. Other Pack synonyms or varieties are sometimes given as Dongolawi, Etbai and Rifawi but these are varieties of the Sudanese Riding donkey rather than the Sudanese Pack. The **Sudanese Riding** type is larger than the Pack donkey and is dark brown or

reddish-grey, or sometimes pale grey or white (the white riding donkeys of Sudan have a long history). The large **Dongolawi** in northern Sudan is used as a pack animal; its coat is of various colours, usually black, dark brown or reddish grey with white points, or occasionally pale grey or white. A similar type is known in Ethiopia as the Sennar (*see* Ethiopian). The **Etbai**, or *Atbawi* or *Atbai*, is a smaller variety of the Sudanese Riding found in north-east Sudan on the Egyptian borders, mainly in the Beja tribal area between the Red Sea Mountains and the coastal area north of Port Sudan; it is reported to be a trotting donkey with a 'difficult' character and is grey with a black or dark shoulder stripe. The **Rifawi** in northern Sudan is a dark brown or reddish grey pack donkey, occasionally pale grey, white or roan, and is sometimes known as the *Shindawi* Riding donkey.

In north-west Eritrea the Sudanese Riding donkey is known as **Kassala** (*see* Ethiopian). Eritrea is sandwiched between Sudan, Ethiopia and the Red Sea and in western Eritrea the local types are classified by body conformation and working speed. Their names are similar to those in Sudan and include the **Mekadi**, **Atbawi** (= Etbai) and **Riff** or Reef (= Rifawi) (Hamid, 2004). The Riff is an all-purpose fast-striding donkey used mainly for human transport in the lowlands, while the more popular Mekadi, shorter than the Riff, is a pack animal used extensively in the lowlands and highlands. Donkeys in Eritrea are used for riding to work in the fields, carrying water back to the homestead and ploughing on light soils, but above all they are pack animals, traditionally loaded in the highlands without the benefit of pack saddles or supporting frames with perhaps no more than a sack to protect their skin. In the 1990s the use of pack saddles increased substantially among refugees returning home from Sudan after the liberation of Eritrea in 1991, when the government set up a resettlement programme that provided families with 2 ha of farm land, tools, seeds and livestock, including donkeys to reduce the workload of farmers, particularly the women in the family.

Sudano-Sahelian (*Burkina Faso, Chad, Mali, Niger and Senegal*)
The belt of the semi-arid Sahel region runs from the Red Sea to the Atlantic between the Sahara desert and the Sudanian savannah and across the southern reaches of Northern Africa and the northern parts of West Africa, including parts of Burkina Faso, Mali, Niger and Senegal.

In all four countries, donkey numbers have increased hugely over the past 50 years (*see* Table 1). According to FAO statistics, in Burkina Faso they have risen from 140,000 in 1961 to 1.1 million in 2013; in Mali from 294,000 to 939,835; in Niger from 301,000 to 1,168,000 (though government data for 2001 gave only 334,000); and in Senegal from 65,000 to 459,000. Niger now has the world's sixth highest donkey population and Burkina Faso the tenth highest.

There has been no attempt to characterize different populations in Burkina Faso or in Niger; they are simply known as the local donkey. The animals are basically workers, but both countries export several thousand donkeys on the hoof annually to neighbouring countries, and in Burkina Faso there is quite a strong market for donkey meat (average carcass weight 51 kg). Their main role in Niger is in transport, or in harness for fieldwork and to a lesser extent for mine-water drainage. It is noted in Niger that coat colours vary: most of the donkeys are grey with pale points but main colours also include russet red, black, white and beige. During the colonial period, when donkeys were introduced for draught work, there was a limited amount of crossing Niger's local donkeys with imported Moroccan donkeys to improve them but this experiment seems to have been abandoned in about 1950 and there has been very little interest in improvement since.

In Mali, which was once one of three kingdoms that controlled trans-Saharan trade in important commodities such as salt and gold (still a major export, along with cotton), donkeys are very widely used in all parts of the country for all sorts of work but have not been fully characterized. They are listed as including the grey **Sahel**, grey **Gourma** (Gourma, in the Tombouctou region but near the central region of Mopti, is also home to the Mali elephant), beige **Miankala** with dark shoulder cross (in the Koutiara area of the Sikasso region, southern Mali) and slate-grey **Yatenga** (in the *cercles* – subdivisions within each of the country's eight regions – of Bandiagara, Koro and Bankass in Mopti region, central Mali). There is also mention of the locally adapted *âne du Nord* and *âne du plateau Dogon*, but the latter plateau is in the same area as the cliffs of Bandiagara in Mopti and the donkey is presumably therefore the same as the Yatenga type.

In Senegal, which shares its eastern border with the extreme south-west of Mali, again detailed characterization is lacking but the donkeys are mainly found in rural areas in the northern and central parts of the country. The animals tend to be left to forage for themselves even when they are used for transport and on the farm. Along with horses, donkeys have taken over as draught animals from cattle. In the drier northern zone, where vegetation is more sparse, there is a strong preference for donkeys because of their hardiness. Listed types are all colour varieties of the typical Sudano-Sahelian draught donkey and include the mouse-grey **Had**, the white **Porro**, the grey to reddish-brown **Sëng** and the black-brown **Sirou** (with white underside) in the Matam region.

Like Niger, neighbouring Chad is a landlocked country, with Sudan on its eastern border. Its widespread donkey population, essential to many people, has not increased as dramatically as those of other Sudano-Sahelian countries: it was around 400,000 in 1961 and is now around 480,000. Again there has been no interest in characterizing the country's donkeys, which are simply 'local' and usually grey, or brown, with a shoulder cross.

Swedish *see* European

Syrian (*Syria, Israel*)
Although the donkey has a very long history in Syria, dating back to the times of ancient Assyria when sturdy black donkeys were particularly favoured (*see* Anatolian), there are only about 99,000 donkeys and 2800 mules in the country, compared with 186,000 and 72,000, respectively, in 1961. They are used as draught animals in subsistence systems and the reduction in interest in donkeys is largely due to agricultural and transport mechanization. There is little or no interest in breeding or improving donkeys in the country but there are two indigenous types, both widespread and both also found in Israel. The **Syrian**

is black, grey or brown; and its larger variety, the **Damascus**, is usually white, sometimes with a spotted face, or may be brown to black. J.C. Loudon (1825) noted that there were two types in Syria: one similar to those seen in England, the other very large and with remarkably long ears; both were used for carrying burdens and sedan-chairs.

Syrian wild ass
The Syrian wild ass or *achdari*, also called the Mesopotamian or Syrian onager, is sometimes classified as *E. hemionus hemippus* but also as a separate species, *Equus hemippus* (Groves and Grubb, 2011). It was extinct by the late 1920s, but until then it had been present in the deserts of Syria, Iraq, Jordan and Palestine. It was very small, perhaps 90 cm at the shoulder, and was sandy in colour with a white belly and a dark dorsal stripe.

In 1905 Sir Austen Layard reported that the Bedouin 'bring the foals up with milk in their tents . . . They are of a light fawn colour – almost pink. The Arabs still eat their flesh.' He was referring to the Syrian wild ass, which was already scarce in the Syrian desert and Palestine in the mid-19th century but still common then in Mesopotamia; one writer in 1850 said that the asses could be seen in the summer travelling in 'great white herds' as far as the Armenian mountains. In 1625 the Italian traveller Della Valle had described a captive 'wild ass or little onager' in Basra, southern Iraq, but usually the asses were hunted for the pot and the hunters preferred to take young ones in the spring foaling season. The wild asses had always been considered as game rather than potential domesticants as beasts of burden: bas-reliefs dating to around 650 BC in Nineveh (in ancient Assyria, now northern Iraq) show royal hunting expeditions that include scenes of a Syrian wild ass being lassoed, despite its renowned fleetness of foot. The Syrian herds faced much more formidable opponents during World War I, when the region was overrun with heavily armed Turkish, Bedouin and British troops, and it would be a combination of motorized transport and firearms that would finally bring about the extinction of the Syrian wild ass. The zoologist, Israel Aharoni, wrote in 1930: 'The movements of Bedouin troops during the Great War and the more recent incursions of the Wahabi tribes . . . have pushed back these extraordinarily shy, freedom-loving creatures into the heart of the desert. They appear so sporadically now that most Bedouin tribes have not seen them at all in recent years.'

The last record of a Syrian wild ass was of one that was shot in 1927 when it came to drink at the Al Ghams oasis near Lake Azrak in the Sirhan depression of north Arabia, a lava-bed district that appears to have been one of the Syrian wild ass's last three refuges – the others were the Jebel el Druz in southern Syria and the Jebel el Sinjar on the Syria/Iraq border. It was from the latter region that Schonbrunn Zoo received a specimen that was still at the zoo in 1928 but might have been the last purebred Syrian wild ass in the world. It has been claimed that tribes such as the Shaleib traditionally released their domestic donkeys to be impregnated by the wild asses and that therefore, in theory, the bloodline of *E. hemippus* continued, albeit diluted.

Taihang (*E China: Taihang and Yan mountains*)
The area for the Taihang donkey is between the Taihang and Yan mountain regions. The Taihang mountain range is along the eastern edge of the Loess Plateau and defines Shanxi province (whose name means 'west of the mountains') and Shandong province ('east of the mountains'); it covers parts of Shanxi, Henan and Hebei provinces. The Yan mountains (Yangshan) are in northern Hebei province on the north of the North China Plain. The Taihang donkey is found mainly in Hebei, especially in the southern prefectures of Handan, Xingtai and Baoding and also the coastal prefecture of Shijiazhuang to the east of Beijing. The donkey has a large head, long ears, a square-shaped body and long strong legs and the usual colour is described as 'French', followed by black. Average height 102 cm. Apparently the donkeys can cover 70 km a day carrying a 75 kg load.

Tajik *see* Central Asian
Thor-char *see* Asiatic wild ass

Thuringian Forest (*C Germany*)
The Thuringian Forest in central Germany is a popular tourist destination into the mountains with a well known hiking trail. Among the attractions is the chance of a donkey ride, but the donkeys, known in German as *Thüringer Waldesel* and in the past as *Mülleresel* (miller's donkey) or *Steinesel* (stone donkey), cannot be described as a breed. They are based on a stock of native donkeys gathered from West Thuringia, Saxony and Saxony-Anhalt and bred at Thuringian Zoo (*Thüringer Zoopark*) in Erfurt and *Wildpark Hundshaupten* in Egloffstein, boosted by donkeys of a similar appearance imported from the UK. The population is only a handful and there is no stud book or breed standard, nor is there a society for its conservation. The donkeys are small (100–110/95–110 cm, 133–210/156–185 kg) with a stone-grey coat, white points, black dorsal and shoulder stripes, and sometimes with leg stripes.

Tibetan (*SW China and Nepal*)
The high arid plateau of the Tibet (or Xizang) Autonomous Region is in South-west China. It is the traditional home of the Tibetan people, and famously of the Tibetan yak. There are also donkeys in the region, mainly in the south Tibetan prefectures of Shannan (Gonggar, Nedong and Lhunze counties in the northern and central parts of the prefecture) and Shigatse (Shigatse, Gyantse and Bainang counties in the east). They are well adapted to the challenging environment, including resistance to the winter cold and to disease. The Tibetan is a small donkey, with an average height of about 99 cm and a small compact body. The coat is usually black, or may be grey with dark dorsal and shoulder stripes and sometimes with leg stripes. It is a useful worker as a pack, draught or riding donkey, capable of carrying loads of about 50 kg (100 kg maximum).

Toposa *see* Sudanese
Tulufan *see* Xinjiang
Tunisian *see* North African
Turkmen *see* Central Asian; Mary
Uzbek *see* Central Asian

Viterbo Grey (*C Italy: N Lazio region*)
A particularly docile, intelligent and courageous donkey, the *asino Viterbese* or *Grigio Viterbese* originated in the aluminium-rich Tolfa mountains in Viterbo province, Lazio region, and

especially around the Allumiere municipality in the region's Rome province – hence the donkey's synonym, *asino di Allumiere*. Its main roles are as a beast of burden, or traditionally (since 1500) for donkey racing in Allumiere; it is now used for tourist rides, onotherapy (using donkeys in therapy for humans with intellectual and other disabilities; *onos* is Greek for ass; Karatosidi *et al*., 2013) and the production of milk and meat, or simply as a pet because of its good nature. The coat is light to dark bay at birth but gradually changes over the next 30 months to brownish grey, then dapple grey and finally, in older animals, very light grey. The legs, muzzle and underside are pale grey. There is sometimes a dorsal stripe with shoulder stripe (*riga mulina crociata*). The head has a straight or slightly convex profile, the upright ears are of medium length, the nostrils are narrow, the small mouth has thin lips and the eyes are small. The mane is short and erect, the neck and withers are muscular, the lean legs are strong and muscular and carry the donkey at an energetic pace on large, dark and very hard hoofs. Height ranges: 119–137/112–135 cm. The grey Viterbo was thought to be extinct at the turn of the century but was rescued from the brink by a few enthusiastic breeders: in 2012 it was reinstated as a recognized breed and is now being bred on the shores of Lake Martignano.

Also in Lazio, in the region of the Lepini Mountains in the provinces of Latino and Roma, there is a dark **Monti Lepini** donkey and its population and characteristics are being evaluated. It is relatively small, with a grey to dark brown or black coat (short and smooth in summer, thicker and longer in winter), with or without a dorsal stripe. The facial profile is straight; it has small eyes, long ears, a strong neck, straight back and slender but strong legs with cylindrical black hoofs. It is a working donkey, now used for trekking, baggage, riding, guarding flocks or for pet therapy, and also for niche-market meat and to some extent for milk products. The donkeys are monitored by ARSIAL (*Agenzia Regionale per lo Sviluppo e l'Innovazione dell'Agricoltura del Lazio*).

Walloon *see* Belgian
Wollo *see* Ethiopian
Wutou *see* Dezhou

Xinjiang (*NW China: Xinjiang*)
The huge and sparsely populated Xinjiang Uygur Autonomous Region in North-west China is home to various local donkeys, especially in the prefectures of Kashi (Kaxgar) and Hotan in the south-west of the province, Aksu in the mid-west and Turpan and Hami (Kumul) in the east. In general the Xinjiang donkeys are small, with short strong legs and small symmetrical bodies; heights are in the ranges of 102–119/100–119 cm. The most common coat colours are black and bay. They are used as pack donkeys (carrying capacity 560–700 kg) and as draught and riding animals. They include local **Kashi**, **Kuce** (in the Tian Shan mountains) and **Tulufan** (Turpan) donkeys. There are still a few thousand chestnut-coloured wild kiang (*qv*) in southern Xinjiang, especially in the Arjin Shan nature reserve in the south-east.

Yangyuan (*N China: NW Hebei*)
Yangyuan is a county in north-west Hebei's Zangjiakou prefecture. The Yangyuan donkey is also found in other counties of the same prefecture (Huai'an and Xuanhua) and in Wei county in the prefecture of Handan in southern Hebei. It is a compact and symmetrical type and of good size, with an average height of 136 cm. The most common coat colours are black, blue or grey and the donkeys are valued for draught work (two donkeys can plough 3 acres a day), pack carrying (capacity 500 kg) and as a source of meat that is described as 'lustrous, slightly red without fishy smell' (dressing percentage 56%).

Yemeni (*Yemen*)
The number of donkeys in Yemen is decreasing and the population in 2012 was 500,000 but apparently 718,000 in 2013 (FAO statistics). They are used in agricultural work and for transport and riding. Officially three breeds are reported, all of them at risk and with very little information about them. The small grey **Qirmani** or *Qaramani* is used for riding and work; the **Sibiani** or *Subyani* is thought to have originated in Sudan; and the grey **Somali** is similar to the Sudanese (*qv*). These three types were mentioned in the country's animal genetic resources report to the FAO published in 2002. Another type oddly named the 'National Genatic' is listed in Yemen's DAD-IS returns but with no details. More interesting are the feral donkeys on Socotra Island (*qv*).

Yunnan (*SW China: Yunnan*)
Sometimes linked with the small South-west China (*qv*) of neighbouring Sichuan province, the Yunnan is the southernmost of China's donkeys. It is found mainly in the west, in the Dali Bai autonomous prefecture, in counties such as Xiangyun, Binchuan, Midu and Weishan Yi & Hui. It is a small type, with an average height of 94 cm and a small body, with a wide head. The coat colour is usually black, grey or pinto (i.e. spotted). It is mainly used as a pack and draught donkey and can travel 30 km a day carrying 50–70 kg. The meat is fine-textured (dressing 48.6%).

Zamorano-Leonesa (*NW Spain: W Castile & León*)
Named for the provinces of Zamora and León in the autonomous community of Castile & León, this breed is unusual for its shaggy coat: its region experiences hot summers but quite cold winters. Synonyms for the Zamorano-Leonesa (*Zamorano Leonés*) sometimes include *Carbajales* (named for a small village in Zamora), *Garañon Leonés* (*garañon* = ass stallion) and *Zamordana*. The jacks are quite large (140–155 cm at the withers) and are prepotent in transmitting heritable traits; they have contributed to the Poitou and the American Mammoth Jackstock among other breeds, and were widely exported from the early 18th century (and even, some say, in the 13th century).

The breed has a long history, with claims going back to the 10th century, and was perhaps at its peak in the 19th and early 20th centuries, when the jacks were noted for siring excellent mules on which the region depended for transport and tillage. However, mules rapidly fell out of favour with the coming of the railways and motorized transport and the donkey population declined equally rapidly. As well as mule breeding, the donkey's traditional roles in agriculture had included transporting people, crops, livestock equipment and fodder, water

and firewood and agricultural work on light soils. Those roles have now been transferred to cultural and recreational use, especially connected with tourism, and because of their good nature the donkeys are also companion animals and are used in animal-assisted therapy.

In 1940 a stud book had been founded for the donkeys of Zamora and León but by the 1960s the breed had all but disappeared, though a nucleus herd was retained by the ministry of agriculture. In 1980 the breed was classified as in need of official protection and in 1987 it was formally recognized as endangered. In 1995, with local government support, the *Asociación de Ganado Selecto de Raza Zamorano Leonesa* (ASZAL) was set up to maintain the purity of the breed and to promote it; those who owned the donkeys began to receive government aid in an attempt to rescue the breed from extinction. A new stud book was established in 1998. The breed association now has about 550 members and there are more than 900 breeding animals. One of the problems for the future of the breed, however, is the increasing age of the animals' owners (most of whom are retired) and the increasing age of the donkeys themselves: foaling rates are worryingly low through a combination of the high average age of the parent generation and various reproductive and other health problems. A high proportion of the females are infertile or have difficulties during parturition.

The Zamorano-Leonese is a substantially built and robust animal, with a strong skeletal structure, a characteristically large head (smaller in the female) with a heavy fringe over the forehead, large upright mobile ears, a flared muzzle, strong jaws, short straight muscular neck, broad deep chest, strong and fairly short concave back, long thick muscular legs well covered with hair, and broad well developed hoofs. The concave profile of the body is masked by the thick coarse coat, which is dark brown to dirty black with silvery points. There is notable sexual dimorphism: average heights are 141/134 cm; average male weight 350 kg.

Zebra hybrids (*USA*)

There are three zebra species: the Plains zebra of southern and eastern Africa (*Equus quagga*, including the subspecies Burchell's, Grant's, Selous', Chapman's and Crawshay's zebras and the extinct quagga); the Mountain zebra of south-west Africa (*Equus zebra*, including Cape and Hartmann's mountain zebras); and Grévy's zebra (*Equus grevyi*). The latter is the largest of the three and is more donkey-like, compared with the more horse-like other species; it is also the rarest and is classified as endangered.

Zebras, like donkeys and horses, are equids and it is possible to crossbreed a zebra with a donkey or with a horse. There is a substantial difference in the diploid number of chromosomes (horses 64, donkeys 62 and zebras between 32 and 46, depending on species) and the hybrid offspring are sterile. The most common system is to breed a zebra stallion to a horse mare or a donkey jenny.

Various terms have been used for such crosses, most commonly 'zebroid' (whether the cross is with donkey or horse). This is the earliest known term, used in the late 19th century and meaning 'zebra-like' (-oid: denoting form or resemblance) and at the time referred to horse/zebra crosses in an age when some people had ambitious hopes for zebra hybrids: Baron de Parana of Brazil, a noted zebra-breeding enthusiast, declared that the zebroid would be 'the mule of the 20th century'. Another word used in the same period was 'zebrule' or 'zebra mule'. Since then, many other terms have emerged. In 1953 the word 'zonkey' was coined by a journalist when the offspring of a zebra stallion and a donkey jenny was exhibited at Bronx Zoo in New York. The same combination at Colchester Zoo (UK) in 1971 was called a 'zedonk', and in Jerusalem Zoo a couple of years later the word used was 'hamzab'. Other words for the donkey hybrid include 'zebronkey' and 'zebrass'. For the much less likely cross of a jack with a zebra mare there are words like 'donkra', 'zebret' (incorporating jennet) or 'zehinny'.

With horse crosses, the terms include 'zorse' for a cross between a zebra stallion and a horse mare, and 'zony' or 'zeony' for a cross with a pony (or, misleadingly, 'zetland' when crossed with a Shetland pony). A more fanciful recent term is 'golden zebra', because of the visual result of combining a zebra's stripes with a mare's bay or chestnut coat colour.

Novelty value apart, the main reason for hybridization arose when attempts were made to 'domesticate' the zebra and train the animals for riding, especially in Africa where horses were less disease-resistant than zebras. It was soon found that, being a wild animal, the zebra was quick to panic under stress and was generally unpredictable; it was also difficult to fit a saddle on a zebra because of its lack of withers. Yet in the mid-19th century the governor of New Zealand used zebras imported from South Africa to draw his carriage; and in the early 1890s Captain Horace Hayes trained a Mountain zebra stallion for riding within a couple of days and suggested that the Burchell's zebra and the quagga would be ideal for domestication, being easy to train to saddle and to harness. In the early years of the 20th century, zoologist Walter Rothschild (1868–1937) used a team of zebras to draw his carriage in the streets of London, while a doctor in Nairobi rode a zebra for his house-calls.

During the Boer wars, the Boers used crosses of Chapman's zebra and pony as draught animals to haul guns. There had been various experiments with crossing zebras and horses during the 19th century, though mainly out of curiosity rather than for practical reasons. The zebroid never did become the 20th century mule, but various combinations have been used successfully as riding and draught animals here and there; and others are concentrating on using purebred zebras as riding, pack or in-harness animals.

The zebra species most commonly used in hybrid breeding are Grevy's (the largest at about 13 hands, and looking more donkey-like than other species, with very large flared conical ears and numerous narrow stripes) and two of the Plains zebras: Grant's and Damara (Burchell's). Zebra/donkey hybrids tend to look like donkeys with zebra stripes over their coloured coats (especially on the legs) but the amount of striping varies, though usually there is the typical donkey's dark dorsal stripe and often a ventral stripe as well.

References and Further Reading

Admassie, Y., Abebe, M., Ezra, M. and Gay, J. (1993) *Ethiopian Highlands reclamation study: report on sociological survey and sociological considerations in preparing a development strategy*. Working paper No. 4. Institute of Development Research, University of Addis Ababa, Ethiopia

Al-Busadah, K.A. and Homeida, A.M. (2005) Some physical variables, biochemical and haematological parameters in Hassawi Ass. *Scientific Journal of King Faisal University (Basic and Applied Sciences)* 6(1 1426), 145–152

Anonymous (2013) *Using Science to Improve the BLM Wild Horse and Burro Program: A Way Forward*. Committee to Review the Bureau of Land Management Wild Horse and Burro Management Program; Board on Agriculture and Natural Resources; Division on Earth & Life Studies; National Research Council of the National Academies. National Academies Press, Washington DC

Aranguren-Méndez, J., Jordana, J. and Gomez, M. (2001) Genetic diversity in Spanish donkey breeds using microsatellite DNA markers. *Genetics Selection Evolution* 33(4), 433–442

Aranguren-Méndez, J., Gómez, M. and Jordana, J. (2002) Hierarchical analysis of genetic structure in Spanish donkey breeds using microsatellite markers. *Heredity (Edinburgh)* 89(3), 207–211

Arsenos, G., Gelasakis, A.I. and Papadopoulos, E. (2010) The status of donkeys (*Equus asinus*) in Greece. *Journal of the Hellenic Veterinary Medical Society* 61(3), 212–219

ATNESA (1997) *Improving Donkey Utilization and Management*. Report of the International ATNESA workshop held 5–9 May, 1997, Debre Zeit, Ethiopia

Aubaile, F. (2012) Pathways of diffusion of some plants and animals between Asia and the Mediterranean region. *Revue d'ethnoécologie* [En ligne], 1|2012, mis en ligne le 20 novembre 2012. URL: http://ethnoecologie.revues.org/714; doi 10.4000/ethnoecologie.714

Beja Pereira, A., England, P.R., Ferrand, N., Jordan, S., Bakhiet, A.O., Abdalla, M.A., Mashkour, M., Jordana, J., Taberlet, P. and Luikart, G. (2004) African origins of the domestic donkey. *Science* 304(5678), 1781

Berhanu, A. and Yoseph, S. (2011) *Donkeys, Horses and Mules – their contribution to people's livelihoods in Ethiopia*. The Brooke, Addis Ababa, Ethiopia

Bigi, D. and Zanon, A. (2008) *Atlante delle razze autoctone: Bovini, equini, ovicaprini, suini allevati in Italia*. Edagricole, Milan, pp. 158–159. [In Italian]

Blench, R.M. (2000) A history of donkeys, wild asses and mules in Africa. In: Blench, R.M. and MacDonald, K.C. (eds) *The Origins and Development of African Livestock: archaeology, genetics, linguistics, and ethnography*. UCL Press, London, pp. 339–354

Blench, R.M. (2004) The history and spread of donkeys in Africa. In: Starkey, P. and Fielding, D. (eds) *Donkeys, People and Development*. A resource book of the Animal Traction Network for Eastern and Southern Africa (ATNESA). ACP-EU Technical Centre for Agricultural and Rural Cooperation (CTA), Wageningen, The Netherlands, pp. 22–30

Blench, R.M. and MacDonald, K.C. (eds) (2000) *The Origins and Development of African Livestock: archaeology, genetics, linguistics and ethnography*. UCL Press, London

Blench, R., de Jode, A. and Gherzi, E. (2004) Donkeys in Nigeria: history, distribution and productivity. In: Starkey, P. and Fielding, D. (eds) *Donkeys, People and Development*. A resource book of the Animal Traction Network for Eastern and Southern Africa (ATNESA). ACP-EU Technical Centre for Agricultural and Rural Cooperation (CTA), Wageningen, The Netherlands, pp. 210–219

Bőkőnyi, S. (1991) The earliest occurrence of domestic asses in Italy. In: Meadow, R.H. and Uerpmann, H.P. (eds) *Equids in the Ancient World*, Vol. II. Ludwig Reichart, Wiesbaden, Germany, pp. 178–216

Bordonaro, S., Guastella, A.M., Criscione, A., Zuccaro, A. and Marletta, D. (2012) Genetic diversity and variability in endangered Pantesco and two other Sicilian donkey breeds assessed by microsatellite markers. *ScientificWorldJournal* 2012:648427 (Epub 2012 Apr 29)

Bough, J. (2006) From value to vermin: a history of the donkey in Australia. *Australian Zoologist* 33(3), 388–395

Burke, A., Eisenmann, V. and Ambler, G.K. (2003) The systematic position of Equus hydruntinus, an extinct species of Pleistocene equid. *Quaternary Research* 59, 459–469

Cardoso, J.L. (2010) Cult artifacts from the Neolithic and Chalcolithic settlement of Leceia, Oeiras, Portugal. In: Gheorghiu, D. and Cyphers, A. (eds) *Anthropomorphic and zoomorphic miniature figures in Eurasia, Africa and Meso-America: morphology, materiality, technology, function and context*. British Archaeological Reports, Oxford, pp. 37–41

Cardosa, J.L., Vilstrup, J.T., Eisenmann, V. and Orlando, L. (2013) First evidence of *Equus asinus* L. in the Chalcolithic disputes the Phoenicians as the first to introduce donkeys into the Iberian Peninsula. *Journal of Archaeological Science* 40(12), 4483–4490

Cheng Peilieu (1984) *Livestock breeds of China*. FAO Animal Production & Health Paper no. 46, FAO, Rome

Chicoli, N. (1870) In: Riproduzione, Allevamento et Miglioramento degli animali domestici in Sicilia. Stamperia de G. Lorsnaidar, Palermo, pp. 131–132

Chiofalo, L. (2008) Attualitá dell'asion come animale in produzione bio-zootecnica. In: L'asino all' attenzione della comunitá scientifica e del territorio. Chiriotti (eds), Pinerdi, Italy

Clutton-Brock, J. (1981) *Domesticated Animals from Early Times*. Heinemann/British Museum (Natural History), London

Clutton-Brock, J. (1992) The process of domestication. *Mammal Review* 22(2), 79–85

Colli, L., Perrotta, G., Negrini, R., Bomba, L., Bigi, D., Zambonelli, P., Verini Supplizi, A., Liotta, L. and Ajmone-Marsan, P. (2013) Detecting population structure and recent demographic history in endangered livestock breeds: the case of the Italian autochthonous donkeys. *Animal Genetics* 44(1), 69–78

Day, D. (1981) *The Doomsday Book of Animals*. Ebury Press, London

Dmitriev, N.G. and Ernst, L.K. (1989) *Animal genetic resources of the USSR*. FAO Animal Production & Health Paper no. 65, FAO, Rome

Dohner, J.V. (2001) *The Encyclopedia of Historic and Endangered Livestock and Poultry Breeds*. Yale University Press, New Haven, Connecticut

Dreyfus, F. (1974) Contribution à l'etude de la zootechine et de la pathologie des equides domestiques en Ethiopie. Thèse pour le doctorat vet. Ecole Nationale Vétérinaire d'Alfort (ENVA), Paris, France

Epstein, H. (1984) Ass, mule and onager. In: Mason, I.L. (ed.) *Evolution of Domesticated Animals*. Longman, London, pp. 174–184

Essin, E.M. (2000) *Shavetails and Bell Sharps. The History of the US Army Mule*. Bison Books, University of Nebraska Press, Lincoln, Nebraska

Feseha, G., Alemu, G.W., Kelemu, F., Ibro, A. and Yilma, K. (2004) Donkey utilisation and management in Ethiopia. In: Starkey, P. and Fielding, D. (eds) *Donkeys, People and Development*. A resource book of the Animal Traction Network for Eastern and Southern Africa (ATNESA). ACP-EU Technical Centre for Agricultural and Rural Cooperation (CTA), Wageningen, The Netherlands

Fielding, D. and Pearson, R.A. (1991) *Donkeys, Mules and Horses in Tropical Agricultural Development*. Centre for Tropical Veterinary Medicine and School of Agriculture, University of Edinburgh

Floyer, E.A. (1892) The mines of the Northern Etbai or of Northern Æthiopia. *Journal of the Royal Asiatic Society of Great Britain & Ireland* 24(04), 811–833

Förster, F., Riemer, H., Mahir, M. and Darius, F. (2013) Donkeys to El-Fasher or how the present informs the past. In: Förster, F. and Riemer, H. (eds) *Desert Road Archaeology in Ancient Egypt and Beyond. Africa Praehistorica* 27 (Heinrich-Barth-Institut, Köln), pp. 193–218

Gandini, G. and Rognoni, G. (eds) (1997) *An Ethnographic Atlas of Italian Horse and Ass Population.* Città Studi Edizioni, Milan

Gayot, E. (1860) L'industrie mulassière a Poitou. *Journal d'agriculture pratique*, Vol. 2

Geigl, E.M. and Grange, T. (2012) Eurasian wild asses in time and space: morphological versus genetic diversity. *Annals of Anatomy* 194(1), 88–102

Gifford-Gonzalez, D. and Beja-Pereira, A. (2008) The multiple African origins of domestic donkeys. Paper at: Society of Africanist Archaeologists 2008 Conference, Goethe University, Frankfurt, 7–11 Sep. 2008

Giosuè, C., Alabiso, M., Russo, G., Alicata, M.L. and Torrisi, C. (2008) Jennet milk production during the lactation in a Sicilian farming system. *Animal* 2(10), 1491–1495

Gordon, S.J. (1893) Chapter XIV: The Donkey Mart. In: *The Horse World of London*. Religious Tract Society, London

Groves, C.P. (1986) The taxonomy, distribution, and adaptations of recent equids. In: Meadow, R.H. and Uerpmann, P. (eds) *Equids in the Ancient World*, Ludwig Reichert Verlag, Wiesbaden, Germany, pp.11–65

Groves, C. and Grubb, P. (2011) *Ungulate Taxonomy.* The John Hopkins University Press, Baltimore, Maryland

Gutiérrez, J.P., Marmi, J., Goyache, F. and Jordana, J. (2005) Pedigree information reveals moderate to high levels of inbreeding and a weak population structure in the endangered Catalonian donkey breed. *Journal of Animal Breeding and Genetics* 122(6), 378–386

Hamid, E. (2004) The importance of donkeys in a restocking programme in Eritrea. In: Starkey, P. and Fielding, D. (eds) *Donkeys, People and Development*. A resource book of the Animal Traction Network for Eastern and Southern Africa (ATNESA). ACP-EU Technical Centre for Agricultural and Rural Cooperation (CTA), Wageningen, The Netherlands, p.86

Hassan, F. (1993) Town village in ancient Egypt. In: Shaw, T.P., Sinclair, B.A. and Okpoko, A. (eds) *The Archaeology of Africa: food, metals and towns*. Routledge, London, pp. 551–569

Hassan, M.R., Steenstra, F.A. and Udo, H.M.J. (2013) Benefits of donkeys in rural and urban areas in northwest Nigeria. *African Journal of Agricultural Research* 8(48), 6202–6212

Hemami, M.R. and Momeni, M. (2013) Estimating abundance of Persian wild ass Equus hemionus onager in Qatruiyeh National Park, Iran. *Oryx* 47, 226–272

Ivanković, A., Kavar, T., Caput, P., Mioc, B., Pavic, V. and Dovc, P. (2002) Genetic diversity of three donkey populations in the Croatian coastal region. *Animal Genetics* 33(3), 169–177

Ivanković, A., Ramljak, J., Štulina, I., Antunac, N., Bašić, I., Kelava, N. and Konjačić, M. (2009) Characteristics of the lactation, chemical composition, milk hygiene quality of the Littoral-Dinaric ass. *Mljekarstvo* 59(2), 107–113

Jordana, J. and Folch, P. (1996) The endangered Catalonian donkey breed: the main ancestor of the American Ass or Mammoth. *Journal of Equine Veterinary Science* 16(10), 436–441

Kane, A.J. (undated) Lecture 1: Wild and feral donkeys: the BLM Program.

Karatosidi, D., Marsico, G. and Tarricone, S. (2013) Modern use of donkeys. *Iranian Journal of Applied Animal Science* 3(1), 13–17

Kefena, E., Beja-Pereira, A., Han, J.L., Haile, A., Mohammed, Y.K. and Dessie, T. (2011) Eco-geographical structuring and morphological diversities in Ethiopian donkey populations. *Livestock Science* 141, 232–241

Kimura, B., Marshall, F.B., Chen, S., Rosenbom, S., Moehlman, P.D., Tuross, N., Sabin, R.C., Peters, J., Barich, B., Yohannes, H., Kebede, F., Teclai, R., Beja-Pereira, A. and Mulligan, C.J. (2011) Ancient DNA from Nubian and Somali wild ass provides insights into donkey ancestry and domestication. *Proceedings Biological Science* 278(1702), 50–57. doi: 10.1098/rspb.2010.0708. Epub 2010 Jul 28

Kugler, W. (ed.) (2009) *Rare Breeds and Varieties of the Balkan: Atlas 2009. Synonyms, occurrence, description of rare breeds in the Balkan region.* Monitoring Institute for Rare Breeds and Seeds In Europe in collaboration with SAVE Foundation, St Gallen, Switzerland

Kugler, W. (ed.) (2010) *Rare Breeds and Varieties of Greece: Atlas 2010. Synonyms, occurrence, description of rare breeds in Greece*. Monitoring Institute for Rare Breeds and Seeds in Europe in collaboration with SAVE Foundation, St Gallen, Switzerland

Kugler, W., Grunenfelder, H.-P. and Broxham, E. (2008) *Donkey Breeds in Europe: Inventory, Description, Need for Action, Conservation. Report 2007/2008*. Monitoring Institute for Rare Breeds and Seeds in Europe in collaboration with SAVE Foundation, St Gallen, Switzerland

Lei, C.A., Chan, H., Yang, G.S., Sun, W.B., Lei, X.Q., Ge, Q.L., Wang, Z.F., Lu, N., Gao, X. and Hou, W.T. (2005) Study on mitochondrial DNA D-loop polymorphism in Chinese donkeys. *Yi Chuan Xue Bao* 32(5), 481–486 [in Chinese]

Liotta, L. and Chiofalo, L. (2005) Preliminary results on 'Grigio Siciliano' donkey morphometry. *Italian Journal Animal Science* 4 (Suppl. 2), 443

Lopez Lopez, C., Alonso, R. and de Aluja, A.S. (2005) Study of the genetic origin of the Mexican creole donkey (Equus asinus) by means of the analysis of the D-loop region of mitochondrial DNA. *Tropical Animal Health Production* 37 (Suppl. 1), 173–188

Loudon, J.C. (1825) *An Encyclopaedia of Agriculture: comprising the theory and practice of the valuation, transfer, laying out, improvement, and management of landed property; and the cultivation and economy of the animal and vegetable productions of agriculture, including all the latest improvements; a general history of agriculture in all countries; and a statistical view of its present state, with suggestions for its future progress in the British Isles*. Printed in London for Longman, Reese, Orme, Brown, and Green, Paternoster-Row

Mariante, A.S. and Egito, A.A. (2002) Animal genetic resources in Brazil: result of five centuries of natural selection. *Theriogenology* 57(1), 223–235

Marshall, F. and Weissbrod, L. (2011) Domestication processes and morphological change – through the lens of the donkey and African pastoralism. *Current Anthropology* 52(S4)

Mascheroni, E. (1927) *Zootecnica speciale*. UTET, Torino

Michel, C. (2004) The *perdum*-mule, a mount for distinguished persons in Mesopotamia during the first half of the second millennium BC. In: *PECUS. Man and animal in antiquity*. Proceedings of the Conference at the Swedish Institute in Rome, September 9–12, 2002, *ed*. Barbro Santillo Frizell

Moehlman, P.D. (2002) *Equids: Zebras, Asses and Horses: status survey and conservation plan*. International Union for Conservation of Nature, Gland, Switzerland

Moehlman, P. (2005) Endangered wild equids. *Scientific American,* March 2005, pp. 86–93

Moehlman, P.D., Shah, N. and Feh, C. (2008) *Equus hemionus*. In: IUCN 2013. IUCN Red List of Threatened Species. *Version* 2013.2

Nowzari, H., Hemami, M.R., Karami, M., Kheirkhah-Zarkesh, M.M., Riazi, B. and Rubenstein, D.I. (2013) Habitat use by Persian onager (Equus hemionus onager) in Qatrouyeh National Park, Fars, Iran. *Journal of Natural History* (August 2013)

Oakenfull, A., Yohannes, H., Kebede, F., Swinburne, J., Binns, M. and Moehlman, P.D. (2002) *Conservation Genetics of African Wild Asses*. Final report for the Zoological Societies of Chicago and San Diego

Orlando, L., Mashkour, M., Burke, A., Douady, C.J., Eisenmann, V. and Hänni, C. (2006) Geographic distribution of an extinct equid (*Equus hydruntinus*: Mammalia, Equidae) revealed by morphological and genetical analyses of fossils. *Molecular Ecology* 15(8), 2083–2093

Orlando, L., Metcalf, J.L., Alberdi, M.T., Telles-Antunes, M., Bonjean, D., Otte, M., Martin, F., Eisenmann, V., Mashkour, M., Morello, F., Prado, J.L., Salas-Gismondi, R., Shockey, B.J., Wrinn, P.J., Vasil'ev, S.K., Ovodov, N.D., Cherry, M.I., Hopwood, B., Male, D., Austin, J.J., Hänni, C. and Cooper, A. (2009) Revising the recent evolutionary history of equids using ancient DNA. *Proceedings of the National Academy of Sciences of the USA* 106(51), 21754–21759

Orlando, L., Gonolhac, A., Zhang, G., Froese, D., Albrechtsen, A., Stiller, M., Schubert, M., Cappellini, E., Petersen, B., Moltke, I., Johnson, P.L., Fumagalli, M., Vilstrup, J.T., Raghavan, M. *et al*. (2013) Recalibrating Equus evolution using the genome sequence of an early Middle Pleistocene horse. *Nature* 499(7456), 74–78

Paolicelli, F. (2005) Allevamento delle asine da latte. *Rivista di Agraria* 6

Papa, L. and Kume, K. (2012) The results of identification and characterisation of the donkey population in Albania. *Agriculture & Forestry (Podgorica)* 58(3), 125–134

Pérez-Pardal, L., Grizelj, J., Traoré, A., Cubric-Curik, V., Arsenos, G., Dovenski, T., Marković, B., Fernández, I., Cuervo, M., Alvarez, I., Beja-Pereira, A., Curik, I. and Goyache, F. (2013) Lack of mitochondrial DNA structure in Balkan donkey is consistent with a quick spread of the species after domestication. *Animal Genetics* 2013 Aug 27 [Epub ahead of print]

Ramljak, J., Ivanković, A., Kelava, N., Baban, M. and Štulina, I. (2012) Lactation characteristics of Littoral Dinaric donkeys in an extensive pasture system. In: Casasiu, I. (ed.) *Animal Farming and Environmental Interactions in the Mediterranean Region*. European Federation of Animal Sciences, Vol. 131, pp. 255–260

Raziq, A., Khudaidad, M., Yahya, Z.R. and Jabbar, A. (2010) Donkey breeds of the northeastern Balochistan, Pakhtoonkhua and southern Afghanistan. *Proceedings of the 6th International Colloquium on Working Equids: Learning from Others*. India Habitat Centre, New Delhi, 29 Nov to 2 Dec 2010. The Brooke Animal Charity, London

Rizzi, R., Tullo, E., Cito, A.M., Caroli, A. and Pieragostini, E. (2011) Monitoring of genetic diversity in the endangered Martina Franca donkey population. *Journal of Animal Science* 89(5), 1304–1311

Rossel, S., Marshall, F., Peters, J., Pilgram, T., Adams, M.D. and O'Connor, D. (2008) Domestication of the donkey: new data on timing, processes and indicators. *Proceedings of the National Academy of Sciences of the USA* 105(10), 3715–3720

Ryder, O.A. and Chemnick, L.G. (1990) Chromosomal and molecular evolution in Asiatic wild asses. *Genetica* 83(1), 67–72

Salimei, E. and Fantuz, F. (2013) Horse and donkey milk. In: Park, Y.W. and Haenlein, G.F.W. (eds) *Milk and Dairy Products in Human Nutrition: Production, Composition and Health*. Wiley-Blackwell, Hoboken, New Jersey, pp. 594–608

Sotillo, J.L. and Serrano, V. (1985) Producción Animal 1. *Etnología Zootécnica*. Tebar-Flores, Madrid

Sponenberg, P. (2004) Donkey color genetics. In: Matthews, N.S. and Taylor, T.S. (eds) *Veterinary Care of Donkeys*. International Veterinary Information Service, Ithaca, New York

Starkey, P. (1995) The donkey in South Africa: myths and misconceptions. In: *Animal Traction in South Africa: empowering rural communities*. DBSA-SANAT, South Africa

Starkey, P. and Fielding, D. (eds) (2004) *Donkeys, People and Development*. A resource book of the Animal Traction Network for Eastern and Southern Africa (ATNESA). ACP-EU Technical Centre for Agricultural and Rural Cooperation (CTA), Wageningen, The Netherlands

Tadesse, M., Kassahun, A. and Asfaw, M. (2003) *Domestic Animal Biodiversity*. National Biodiversity Strategy and Action Plan (NBSAP) Project, IBCR, Addis Ababa, Ethiopia

Tegetmeier, W.B. and Sutherland, C.L. (1895) *Horses, Asses, Zebras, Mules and Mule Breeding*. H. Cox, London

Veenhof, K.R. (1972) *Aspects of Old Assyrian Trade and Its Terminology*. E.J. Brill, Leiden

Vilá, C., Leonard, J.A. and Beja-Pereira, A. (2006) Genetic documentation of horse and donkey domestication. In: Zeder, M.A., Bradley, D.G., Emshwiller, E. and Smith, B.D. (eds) *Documenting Domestication: New Genetic and Archaeological Paradigms*. University of California Press, Berkeley, pp. 342–353

Vincenzetti, S., Polidori, P., Mariani, P., Cammertoni, N., Fantuz, F. and Vita, A. (2008) Donkey's milk protein fractions characterization. *Food Chemistry* 106, 640–649

Vranova, M., Alloggio, I., Qablan, M., Vyskocil, M., Baumeisterova, A., Sloboda, M., Putnova, L., Vrtkova, I., Modry, D. and Horin, P. (2011) Genetic diversity of the class II major histocompatibility DRA locus in European, Asiatic and African domestic donkeys. *Infection Genetics Evolution* 11(5), 1136–1141

Waller, A.L. (1958) *Horses and Mules and National Defense*. Office of the US Quartermaster General (online at Army Quartermaster Foundation website, www.qmfound.com)

Wilson, R.T. (2003) Biodiversity of domestic livestock in the Republic of Yemen. *Tropical Animal Health Production* 35(1), 27–46

Yilmaz, O. and Wilson, R.T. (2013) The domestic livestock resources of Turkey: notes on donkeys. *Journal of Animal & Plant Sciences* 23(2), 651–656

Yilmaz, O., Boztepe, S. and Ertuğrul, M. (2012) The domesticated donkey: I: Species characteristics. *Canadian Journal of Applied Sciences* 3(2), 339–353

Zhang, Y.S., Yang, X.Y., Wang, X.B., Zhang, C.M., Qin, F., Zhou, Z.H., Lan, X.Y., Chen, H. and Lei, C.Z. (2010) Cytochrome b genetic diversity and maternal origin of Chinese domestic donkey. *Biochemical Genetics* 48(7–8), 636–646

Zhao, C.J., Hann, G.C., Qin, Y.H. and Wu, C. (2005) Differentiating among horse (Equus caballus), donkey (Equus asinus) and their hybrids with combined analysis of nuclear and mitochondrial gene polymorphism. *Journal of Animal Breeding and Genetics* 122(4), 285–288