

Encyclopedia of
Extinct Mammals



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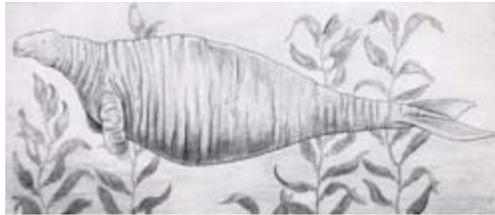
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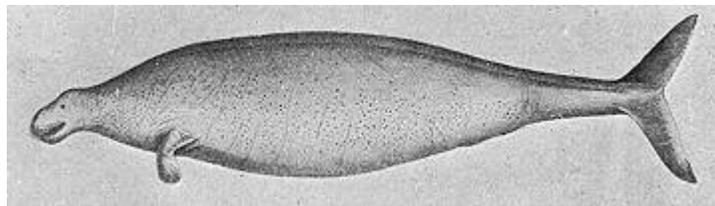
Chapter- 1

Steller's Sea Cow



Steller's sea cow (*Hydrodamalis gigas*) was a large herbivorous marine mammal. In historical times, it was the largest member of the order Sirenia, which includes its closest living relative, the dugong (*Dugong dugon*), and the manatees (*Trichechus spp.*). Formerly abundant throughout the North Pacific, its range was limited to a single, isolated population on the uninhabited Commander Islands by 1741 when it was first described by Georg Wilhelm Steller, chief naturalist on an expedition led by explorer Vitus Bering. Within 27 years of discovery by Europeans, the slow moving and easily captured Steller's sea cow was hunted to extinction.

Description



Drawing of Steller's sea cow, by Georg Steller. Note that the broad, flattened tail is drawn at an angle in order to show its shape.

The sea cow grew at least 8 metres (26 ft) to 9 meters or 30 feet long, much larger than the manatee or dugong. Steller's work contains two contradictory weights: 4 and 24.3 tons. The true value probably lies between these figures, around 8-10 tons. It looked somewhat like a large seal, but had two stout forelimbs and a whale-like tail. According to Steller, "The animal never comes out on shore, but always lives in the water. Its skin is black and thick, like the bark of an old oak..., its head in proportion to the body is small..., it has no teeth, but only two flat white bones—one above, the other below". It was completely tame, according to Steller. They fed on a variety of kelp. Wherever sea

cows had been feeding, heaps of stalks and roots of kelp were washed ashore. The sea cow was also a slow swimmer and apparently was unable to submerge.

Population and extinction



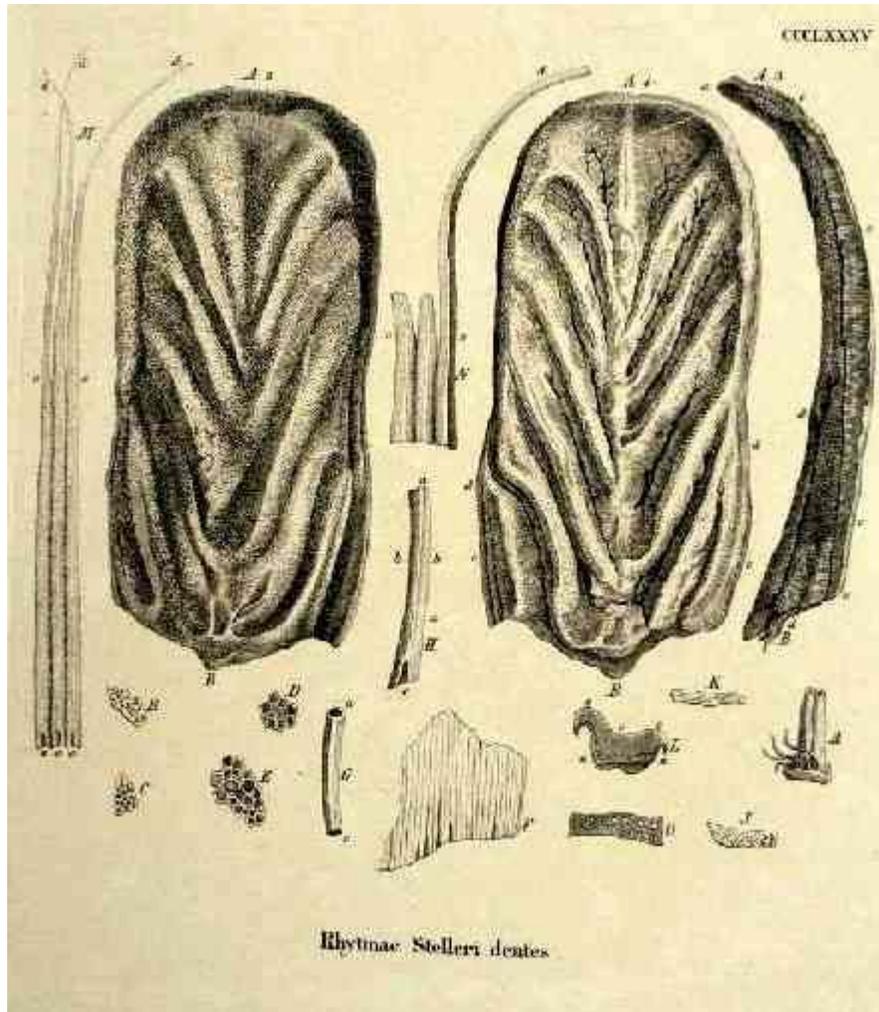
Hydrodamalis gigas skeleton with incorrectly restored hands, Muséum national d'histoire naturelle, Paris



skull

The population of sea cows was small and limited in range when Steller first described them. Steller said they were numerous and found in herds, but zoologist Leonhard Hess Stejneger later estimated that at discovery there had been fewer than 1,500 remaining, and thus had been in immediate danger of extinction from overhunting by humans. They

were quickly wiped out by the sailors, seal hunters, and fur traders that followed Bering's route past the islands to Alaska, who hunted them both for food and for their skins, which were used to make boats. They were also hunted for their valuable subcutaneous fat, which was not only used for food (usually as a butter substitute), but also for oil lamps because it did not give off any smoke or odor and could be kept for a long time in warm weather without spoiling. By 1768, 27 years after it had been discovered by Europeans, Steller's sea cow was extinct.

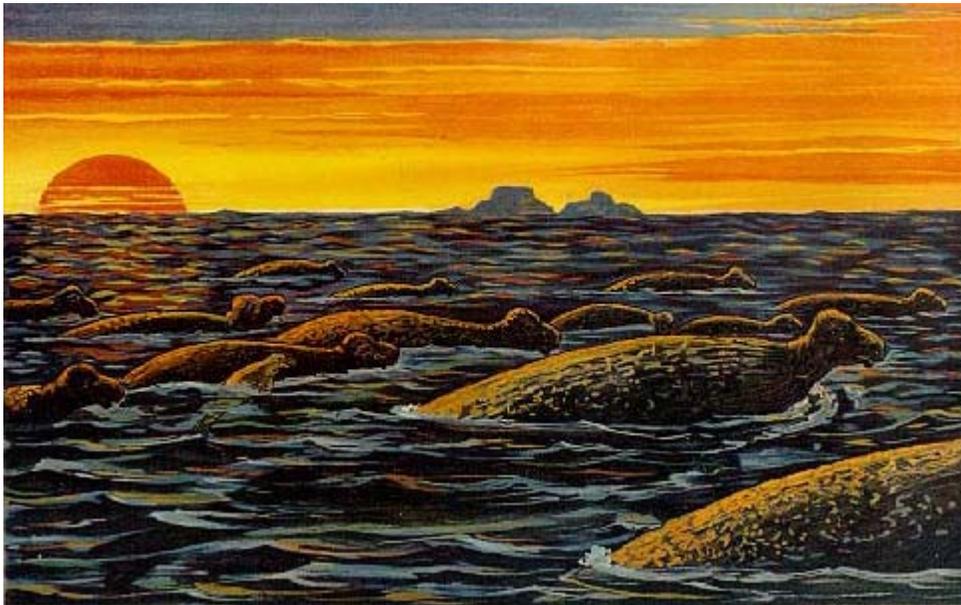


Grinding plates.

Fossils indicate that Steller's sea cow was formerly widespread along the North Pacific coast, reaching south to Japan and California. Given the rapidity with which its last population was eliminated, it is likely that aboriginal hunting caused its extinction over the rest of its original range (aboriginal peoples apparently never inhabited the Commander Islands).

It has been argued that the sea cow's decline may have also been an indirect response to the harvest of sea otters by aboriginal people from the inland areas. With the otters reduced, the population of sea urchins would have increased and reduced availability of kelp, the Steller's Sea Cow's primary source of food. Thus, aboriginal hunting of both species may have contributed to the sea cow's disappearance from continental shorelines. However, in historic times aboriginal hunting had depleted sea otter populations only in localized areas. The sea cow would have been easy prey for aboriginal hunters, who would likely have exterminated accessible populations with or without simultaneous otter hunting. In any event, the sea cow was limited to coastal areas off islands without a human population by the time Bering arrived, and was already endangered.

In literature



Group of Steller's sea cows in a painting from 1902.

Sea cows appear in Rudyard Kipling's short story "The White Seal", where they show the title character a place of refuge from human hunters. Kipling probably knew (a) that the sea cow was considered extinct and (b) that nevertheless people sometimes claimed to have seen them. Thus, his suggestion is that they are around, but mostly hiding.

In Jules Verne's 1870 novel *20000 Leagues Under the Sea*, the travelers in Captain Nemo's fictional submarine *Nautilus* encounter various sirenians during their journey. On February 10 they encounter a female dugong in the Red Sea; Nemo states that hunting has made sirenians scarce, yet Ned Land harpoons the animal to eat. It is described as over 7 m long with a mass of 5000 kg (a size far excessive for a dugong in that habitat, though appropriate for Steller's sea cow, found in colder northern waters but already by then extinct for a century). On April 12, observing a group of West Indian Manatees off Dutch Guiana, Professor Arronax extols their ecological value. Thus, environmental

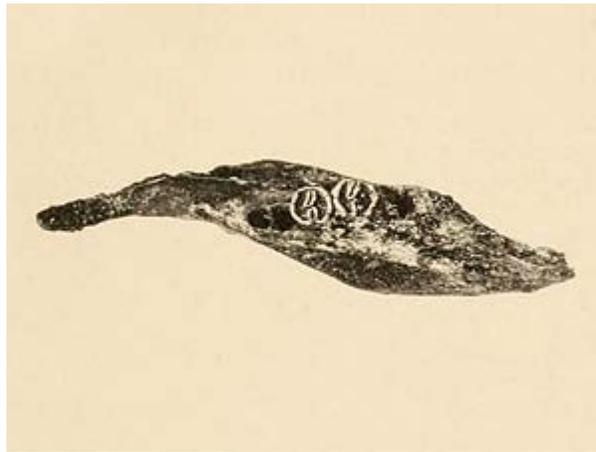
themes were expressed in Verne's writing; though some details may be inexact, this book has likely contributed to a wider public awareness of marine biology and interest in conservation.

In the contemporary literature, Steller's sea cow appears in a book of poetry *Species Evanescens* by Russian poet Andrei Bronnikov. In this book the poet compares the fate of the exterminated animal with the fate of its discoverer. The book examines the personality of Georg Steller and depicts the Kamchatka expedition during which the discovery of the Steller's sea cow had been made.

Chapter- 2

Extinct Rodents

Oriente Cave Rat



Oriente Cave Rat

The **Oriente Cave Rat** (*Boromys offella*) was a species of rodent in the Echimyidae family. It was endemic to Cuba. Its natural habitat was subtropical or tropical moist lowland forests. It is known from recent fossil records, and may have become extinct with the introduction of other rats.

White-footed Rabbit-rat



White-footed rabbit-rat

The **White-footed Rabbit-rat** (*Conilurus albipes*) is an extinct species of rodent, which was originally found in woodlands from Adelaide to Sydney, but became restricted to south-eastern Australia. It was kitten-sized and was one of Australia's largest native rodents. It was nocturnal and lived among trees. It made nests filled with leaves and possibly grass in the limbs of hollow eucalyptus trees. The mother carried her young attached to her teats. John Gould said that he removed a baby from a teat of its dead mother. The baby clung tightly to Gould's glove.

Sydney natives called it 'gnar-ruck' which translates as 'rabbit-biscuit'. It was a problem in the settlers' stores at about 1788. The last specimen was recorded at about 1845, but some were reported in 1856-57 and perhaps in the 1930s. Rats may have transmitted disease or competed directly with the white-footed rabbit rat. Cats may have been predators, while the demise of Aboriginal firestick farming, which maintained woodland, may have doomed the rabbit rat and its habitat.

Oryzomys nelsoni



Oryzomys nelsoni is an extinct rodent of María Madre Island, Nayarit, Mexico. Within the genus *Oryzomys* of the family Cricetidae, it may have been most closely related to the mainland species *O. albiventer*. Since its first description in 1898, most authors have regarded it as a distinct species, but it has also been classified as a mere subspecies of the marsh rice rat (*O. palustris*).

After its discovery in 1897, it has never been recorded again and it is now considered extinct; the presence of introduced black rats on María Madre may have contributed to its extinction. *Oryzomys nelsoni* was a large species, distinguished in particular by its long tail, robust skull, and large incisors. It was reddish to yellowish above and mostly white below. Its diet may have included plant material and small animals.

Taxonomy

Oryzomys nelsoni was collected by Edward William Nelson and Edward Goldman in May 1897 and never found again. Their visit for the Biological Survey of the United States Department of Agriculture was one of the first scientific explorations of the islands. Clinton Hart Merriam identified the mammals they obtained, including four specimens of *Oryzomys nelsoni*, which were deposited in the United States National Museum and remain there. He named it as a species of the genus *Oryzomys*, *Oryzomys nelsoni*; the specific name honors Nelson. Investigators have generally retained it as a species distinct from other *Oryzomys*, but in 1971 Hershkovitz listed it as one of many subspecies of *Oryzomys palustris*, which he envisaged as a wide-ranging species encompassing what is now the marsh rice rat (*O. palustris*) of the southern and eastern United States, *O. couesi* of Central America, and several other species with more limited distributions.

In his 1918 revision of North American *Oryzomys*, Goldman considered *O. nelsoni* to be most closely related to the nearest mainland subspecies of *O. couesi*, *O. couesi mexicanus*. In 2009, Michael Carleton and Joaquin Arroyo-Cabrales revised the *Oryzomys* of western Mexico and confirmed that *O. nelsoni* is a very distinct species. Their morphometrical analysis found some resemblance between the species and *Oryzomys albiventer* of interior mainland Mexico, and they suggested that although

O. nelsoni likely represents an old, distinctive lineage, it may have derived from a common ancestor with *O. albiventer*.

Oryzomys nelsoni is one of about eight species in the genus *Oryzomys*, which occurs from the eastern United States (*O. palustris*) into northwestern South America (*O. gorgasi*). *O. nelsoni* is further part of the *O. couesi* section, which is centered around the widespread Central American *O. couesi* and also includes various other species with more limited and peripheral distributions. Many aspects of the systematics of the *O. couesi* section remain unclear and it is likely that the current classification underestimates the true diversity of the group. *Oryzomys* previously included many other species, which were progressively removed in various studies culminating in a contribution by Marcelo Weksler and coworkers in 2006 that removed more than forty species from the genus. All are classified in the tribe Oryzomyini ("rice rats"), a diverse assemblage of American rodents of over a hundred species, and on higher taxonomic levels in the subfamily Sigmodontinae of family Cricetidae, along with hundreds of other species of mainly small rodents.

Common names proposed for this species include Nelson Rice Rat, Nelson's Rice Rat, Nelson's *Oryzomys*, and Tres Marias Island Rice Rat.

Description



Skull of *Oryzomys nelsoni*, seen from below.

Oryzomys nelsoni was a large and long-tailed *Oryzomys*; its tail was longer than that of any other western Mexican *Oryzomys*. The upperparts were ochraceous to buff, most richly so on the rump, and paler further to the front and low on the flanks. On the head and the back, blackish hairs somewhat darkened the overall color. The underparts were white, with lead-colored underfur that was visible in some places. The ears were covered on both sides with scanty grayish hairs. The large hindfeet were sparsely covered with pale hairs. The tail was largely dark, but the underside of the basal one third to one half was light yellow.

Oryzomys nelsoni was distinctive in its large skull with broad, well-developed incisors and a strong front part (rostrum) that is strongly curved downwards. In *O. albiventer*, the rostrum and incisors were not as massive, but the molars are larger. The interparietal

bone, part of the roof of the braincase, was broad and the incisive foramina, which perforated the palate between the incisors and the molars, were relatively short.

Total length in the four known specimens is 282 to 344 mm (11.1 to 13.5 in), averaging 322 mm (12.7 in); head and body length is 122 to 153 mm (4.8 to 6.0 in), averaging 140.5 mm (5.53 in); tail length is 160 to 191 mm (6.3 to 7.5 in), averaging 181.5 mm (7.15 in); and hindfoot length is 35 to 39 mm (1.4 to 1.5 in), averaging 37.3 mm (1.47 in).

Ecology and extinction

Nelson and Goldman found the species only in a damp, herbaceous site now known as the "Sacatal" near a spring high on María Madre Island, the largest of the Islas Mariás off the coast of Nayarit, western Mexico, and Nelson wrote that it was rare. He gave the elevation of this place as 1800 ft, which Álvarez-Castañeda and Méndez converted to 550 m, but in his 1918 paper, Goldman gave 800 ft instead, which Carleton and Arroyo-Cabrales in 2009 converted to 245 m. The next survey of small mammals on the island took place in March 1976 by a team led by Don E. Wilson. They failed to collect *O. nelsoni* and instead found only the introduced black rat (*Rattus rattus*) at the locality where Nelson and Goldman had collected *O. nelsoni*; this species may have contributed to the decline of the indigenous rodent.

The species is now considered extinct, although as late as 2002 the Mexican government listed it as "threatened". Another Islas Mariás endemic, the deermouse *Peromyscus madrensis*, still occurred on María Madre in 1976. *Oryzomys nelsoni* is thought to have fed on plant material such as weeds, fruit, and seeds, and more rarely on animals such as fish and invertebrates.

Megalomys desmarestii



Megalomys desmarestii

Megalomys desmarestii, also known as the **Martinique Muskrat**, **Desmarest's Pilorie**, or the **Antillean Giant Rice Rat**, is an extinct rice rat from Martinique in the Caribbean. It was among the largest species of West Indian rice rat, as big as a cat, and was one of the first Caribbean mammals to become extinct during the 20th century. It may have been

aquatic, as it was known to escape into the sea when pursued by predators, but it never swam away from the island. It was common on Martinique until the end of the nineteenth century, when attempts were made to exterminate it because it was considered to be a pest in the island's coconut plantations. It was also hunted for food; but to subdue its musky odor before as a cuisine, people had to singe off its hair, expose its body overnight and boil it in two batches of water. On 8 May 1902, the volcano Mount Pelée erupted, completely destroying the island's principal city of Saint-Pierre. It has been speculated that the rice rat became extinct then or during a later eruption in 1902, but predation by introduced mongooses is more likely to have been the primary cause of its extinction.

Gould's Mouse



Gould's Mouse

Gould's Mouse (*Pseudomys gouldii*) lived in eastern inland Australia, and was named after John Gould's wife, Elizabeth. It was slightly smaller than a black rat, and quite social, living in small family groups that sheltered by day in a nest of soft, dry grass in a burrow. It usually dug burrows at a depth of 15 cm under bushes. Gould's mouse was common and widespread before European settlement, but disappeared rapidly after the 1840s, perhaps being exterminated by cats. Alternatively, it may have been out-competed by the introduced rats and mice, succumbed to introduced diseases or been affected by grazing stock and changed fire regimes. The last specimens were collected in 1856-57, and it is presumed to be extinct.

There is some speculation that this species was in fact an eastern population of the Shark Bay Mouse. Once the Alice Springs Mouse was thought to be extinct but with genetic testing in 1998 scientists confirmed that the Alice Springs Mouse was also the

Shark Bay Mouse, and this could also one day happen between Gould's Mouse and the Shark Bay Mouse.

Pemberton's Deer Mouse

From the Greek "pero" = "boots", "mys" meaning "mouse"

The "Mouse With Boots", referring to the white feet.

This group of species *Peromyscus*, also known as the deer mouse, are the most common North American mammals. They tend to occur in range from Alaska to Central America in many different habitats. For the fact that they are so abundant in nature, these mice constitute a large component of the nearctic ecosystems. These mice have also been of very great importance to the scientific research, both the wild type and the genetically variant have been used for laboratory researches. They do differ from the house mouse and the rats, because they are not closely related to these species.

General information

Peromyscus are very cold-tolerant species, they do prefer to live and survive in temperatures between 22–25°C. They are usually sexually mature by 55 days of age. Gestation is 23 days, except in lactating females where it is delayed by 4–6 days to 28 or 30 days. *Peromyscus* breed in mated pairs.

Most species have potential life spans of 4–5 years. Mice of the genus *Peromyscus* range in adult size from 15 g to 150 g. They mostly feed on seeds and berries which constitute about 75% of the diet and about 25% is other animal material. A few are more insectivorous.

Pemberton's Deer Mouse (*Peromyscus pembertoni*) lived on San Pedro Nolasco Island (located:  27°58'03"N 111°22'42"W / 27.96749°N 111.37845°W) in the Gulf of California. The last 12 specimens were collected on 26 December 1931.

This species is no doubt very poorly known. The only island that supported two different species of *Peromyscus*- namely 1)*Peromyscus* (*P. pembertoni*) 2)*Peromyscus* (*P. boylii*)- was San Pedro Nolasco. And they are only known because of the fact that they were collected on this island. Besides these two species no other mammals occurred on the island. They were found or collected on a steep hill covered with grass on the eastern side of the island. The dominant plants found there are as follows: Tree torote, pitayita, liga, Adam's tree, leather plant, fishhook cactus, malva rosa, chain fruit cholla, cardon, slipper plant, jojoba, and organpipe cactus.

Physical description

Peromyscus pembertoni is a medium-sized *Peromyscus*. No significant sexual dimorphism is evident. The tail is usually longer than the head and body is bicolored. Well haired, and tufted at the end. The hind foot is small and similar in length to the ear but sometimes longer. Skull is medium-sized and auditory bullae are not greatly inflated. Upperparts of pelage are medium brown; sides lighter brown with a broad orange lateral line extending from cheek to hindquarters; underparts whitish; ankles dusky gray; and feet whitish below ankle.

Reproduction

The social behaviour of *P. pembertoni* has not been very well studied or investigated. Very little information is available on the mating system. Breeding in *P. pembertoni* occurs throughout most of the year, although the majority of young are born in spring and early summer. Breeding may cease during winter months.

Communication and perception

Like other *Peromyscus* species, they have keen eyesight and vision and extensively use chemical cues in communication.

Predation

P. pembertoni escapes predation through their nocturnal and secretive habits. They are important prey items for many predatory mammals such as preys of birds, snakes, foxes, owls, and hawks.

Life span

The longevity of *Peromyscus* is typically short with few living more than one year or less under natural conditions.

Lesser Stick-nest Rat



Lesser Stick-nest Rat

The **Lesser Stick-nest Rat** or **White-tipped Stick-nest Rat** (*Leporillus apicalis*) lived in Southern inland Australia. It accumulated large mounds of sticks to construct its nests, which were up to three metres long and a metre high. It was easily tamed, sometimes climbing onto tables to get sugar. It was also eaten by people. The last capture was filmed on 18 July 1933, when the stick-nests were set alight. The specimens are held in the South Australian Museum. The rat may have declined from competition with cattle and sheep. There is a possibility that a Lesser Stick-nest Rat was seen in a cave in Western Australia in 1970.

2008 IUCN Change of Status

The 2008 release of the updated IUCN Status for the **Lesser Stick-nest Rat**, has interestingly 'downgraded' their status from Extinct to Critically Endangered (Possibly Extinct), owing to the very slight possibility that a very small population may still exist in yet to be surveyed remote lands of the Australian interior.

On the site, the reasoning is "Listed as Critically Endangered (Possibly Extinct) because, although there are no confirmed reports of this species since 1933, there is a reliable record from 1970 and continued, occasional reports of fresh vegetation being added to old stick-nests. Much of this species' range is in remote portions of central Australia,

which have not been fully surveyed. This species is probably extinct, but if it does persist its numbers would almost certainly be very small."

Chadwick Beach Cotton Mouse

The **Chadwick Beach Cotton Mouse** (*Peromyscus gossypinus restrictus*) is a presumed extinct subspecies of the Cotton Mouse (*Peromyscus gossypinus*) from the genus *Peromyscus*. It was confined to a small area on the Manasota Key peninsula in Florida.

Description

The Chadwick Beach Cotton Mouse was smaller and paler than the nominate race. The total length was 172 mm, the tail length 72.5 mm, the hind foot length 22.3 mm, the ear length 22.3 mm and largest skull length was 27.6 mm. The zygomatic breadth was 13.9 mm, the preorbital breadth was 4.4 mm, the nasal length was 10.9 mm and the length of the teeth in the maxilla was 3.9 mm. The upperparts were pink cinnamon with a rufous hue in the middle of the back. The underparts were white with a pale pink buff wash on the chest. The tail was brown above and buff below. The dorsal stripe in the middle of the back was smaller than in the nominate race.

Distribution

The mouse was primarily found in the Chadwick Beach area at Englewood in Sarasota County and Englewood Beach located in the southern part of Englewood, Florida in Charlotte County.

Habitat and ecology

The Chadwick Beach Cotton Mouse preferred maritime forests with a closed canopy. Characteristic trees of these forests are *Sabal palmetto*, *Quercus virginiana*, and *Juniperus virginiana* var. *silicicola*. It was also found on sand dunes where sea oats (*Uniola paniculata*) a high growing grass species is the dominating vegetation. Like the nominate race the Chadwick Beach Cotton Mouse was nocturnal. The ecology of this subspecies is not studied.

Extinction

The Chadwick Beach Cotton Mouse is only known by 15 specimens collected by Luther C. Goldman in March 1938. It is now presumed extinct after extensive surveys in 1984, 1985, 1988 and 1989 failed to find this mouse again. Causes for its disappearance might have been the deforestation of the maritime forests in the southernmost of the Sarasota County as well as the predation by feral cats.

Little Swan Island Hutia

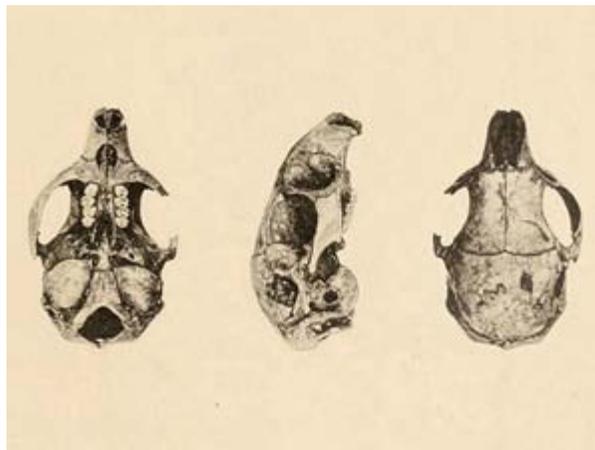


Little Swan Island Hutia

The **Little Swan Island Hutia** (*Geocapromys thoracatus*) is an extinct species of rodent that lived on the Swan Islands, off north-eastern Honduras in the Caribbean. It was a slow-moving, guinea-pig-like rodent and probably emerged from caves and limestone crevices to forage on bark, small twigs and leaves.

It may have been a subspecies of the Jamaican Hutia (*Geocapromys browni*), whose ancestors were carried to the island from Jamaica, 5000-7000 years ago. It was fairly common in the early 20th century, but disappeared after a severe hurricane in 1955, followed by the introduction of house cats to the island.

Torre's Cave Rat



Torre's Cave Rat

Torre's Cave Rat (*Boromys torrei*) was a species of rodent in the Echimyidae family. It was endemic to Cuba. Its natural habitat was subtropical or tropical moist lowland forests.

Bulldog Rat



Bulldog Rat

The **Bulldog Rat** (*Rattus nativitatis*) was a species of rat endemic to the Christmas Island in the Indian Ocean. The rats lived on the higher hills and denser forests of the island. They had short tails and their backs were covered in a two centimetre thick layer of fat. They lived in small colonies, in burrows among the roots of trees or under hollow logs in primary forest. They were sluggish and never climbed and may have seemed half-dazed in daylight. The last record dates from 1903. They may have succumbed to a disease brought by black rats that had been inadvertently introduced by human sailors.

Chapter- 3

Extinct Bats

Puerto Rican Flower Bat

The **Puerto Rican Flower Bat** (*Phyllonycteris major*) is an extinct species of bat from the Phyllostomidae family (leaf-nosed bats). It was endemic to Puerto Rico and is known only from subfossil skeletal material.

Small Mauritian Flying Fox

The **small Mauritian flying fox** or **dark flying fox** (*Pteropus subniger*) is an extinct species of megabat. It lived on the islands of Réunion and Mauritius in the Mascarene Islands of the Indian Ocean. It was abundant, with up to 400 sometimes crowding together at a single roost in a cave or in an ancient, hollow tree, while most other fruit bats prefer to roost in the branches of large trees. Local people believed that there was only one male per roost, which may indicate that the sexes roosted separately and that the large roosts were maternity colonies. The flying fox was nocturnal and had delicate teeth, so it probably fed on nectar and possibly soft fruit.

As it roosted in old trees and caves, it was vulnerable to forest clearance and hunting. It probably vanished in the 19th century. There are specimens in museums in Paris, London, Berlin, and Sydney.

Guam flying fox

The **Guam flying fox** (*Pteropus tokudae*) was a tiny megabat from Guam in the Marianas Islands in Micronesia that was confirmed extinct due to hunting or habitat changes. It was first recorded in 1931 and was observed roosting with the larger and much more common Marianas flying fox. The last specimen was a female found roosting at Tarague cliff in March 1967, but it escaped capture. An unconfirmed sighting took place in June 1974. No others have been sighted since then.

Dusky Flying Fox

The **Dusky Flying Fox** (*Pteropus brunneus*), also known as the Percy Island Flying Fox, is an extinct species of bat in the Pteropodidae family. It was endemic to Percy Island off the southeast coast of Mackay, Queensland in the northeast corner of Australia.

Only one specimen is known to exist. It was collected in 1859 and documented by Dobson in 1878. Since that record, no further documentation is known of this species. Currently, the specimen is located at the British Museum of Natural History and was validated as a separate species in the late 20th century.

Large Palau Flying Fox

The **Large Palau Flying Fox** (*Pteropus pilosus*) is an extinct species of middle-sized megabat from the Palau Islands in Micronesia. It had brownish fur with long, silvery hairs on its belly, and a wingspan of about 60 cm. It probably became extinct around 1874, possibly due to overhunting. It is known from two specimens, one of which is in the Natural History Museum in London.

Panay Giant Fruit Bat

The **Panay Giant Fruit Bat** (*Acerodon lucifer*) is a fruit bat from the Philippines that was declared extinct in 1996. Probable causes include anthropogenic destruction of forest habitat and/or overhunting of the species. Many appeared in camps during World War II.

Nendo Tube-nosed Fruit Bat

The **Nendo** or **Santa Cruz Tube-nosed Fruit Bat** (*Nyctimene sanctacrucis*) is an extinct megabat from the Santa Cruz Group of the Solomon Islands, near the eastern limit of the distribution of tube-nosed fruit bats. It had tube-like nostrils and had a wingspan of about 40 cm.

The last record was from the island of Nendo in 1907. The only specimen was a female donated to the Australian Museum, Sydney, in 1892. It may have become extinct due to forest destruction.

New Zealand Greater Short-tailed Bat

The **New Zealand Greater Short-tailed Bat** (*Mystacina robusta*) was one of two species of New Zealand short-tailed bats, a family (Mystacinidae) unique to New Zealand. It lived on the North and South Islands in prehistoric times and historically lived on small islands near Stewart Island/Rakiura. Short-tailed bats were as adept at scrambling along the ground as they were at flying. Their wings folded into pouches on the sides of their bodies, so the bats could race through burrows or scrub. Adult bats

reached a length of 9 cm. The only known photograph shows the bat covered in dark blue fur.

The Greater Short-tailed Bat was widespread throughout New Zealand before the Māori arrived. In historic times, it used seabird burrows as roosts. It flew slowly, never rising more than two or three metres above the ground. It took nectar from flowering plants and was probably partly carnivorous, taking meat and fat off muttonbirds and eating nestling birds. The last refuges of the bat were on Solander and Big South Cape islands, but Black Rats arrived from fishing vessels in 1962 or 1963. The last bat seen was caught in a mist net on Solander Island in April 1967.

Lord Howe Long-eared Bat

The **Lord Howe Long-Eared Bat** (*Nyctophilus howensis*) is a species of vesper bat in the Vespertilionidae family. It is known only from a single skull found on Lord Howe Island in 1972 and dated to the 20th century. It may thus be extinct; if not it is certainly endangered.

Sturdee's Pipistrelle

Sturdee's Pipistrelle (*Pipistrellus sturdee*) is a bat that lived in Japan before officially becoming extinct in 2000.

Range

Pipistrellus sturdee is known to have existed only on Hahajima Island in Bonin Islands, Japan. Some experts claim that this species never actually lived in Japan and its locality in Japan is just an error. As a result, the true distribution and origin of this animal is unknown.

Population

The previous population of this animal is unknown because only one specimen has been preserved, which is currently housed in the British Museum of Natural History. There have been no additional records of the Sturdee's Pipistrelle for over a century.

Chapter- 4

Aurochs

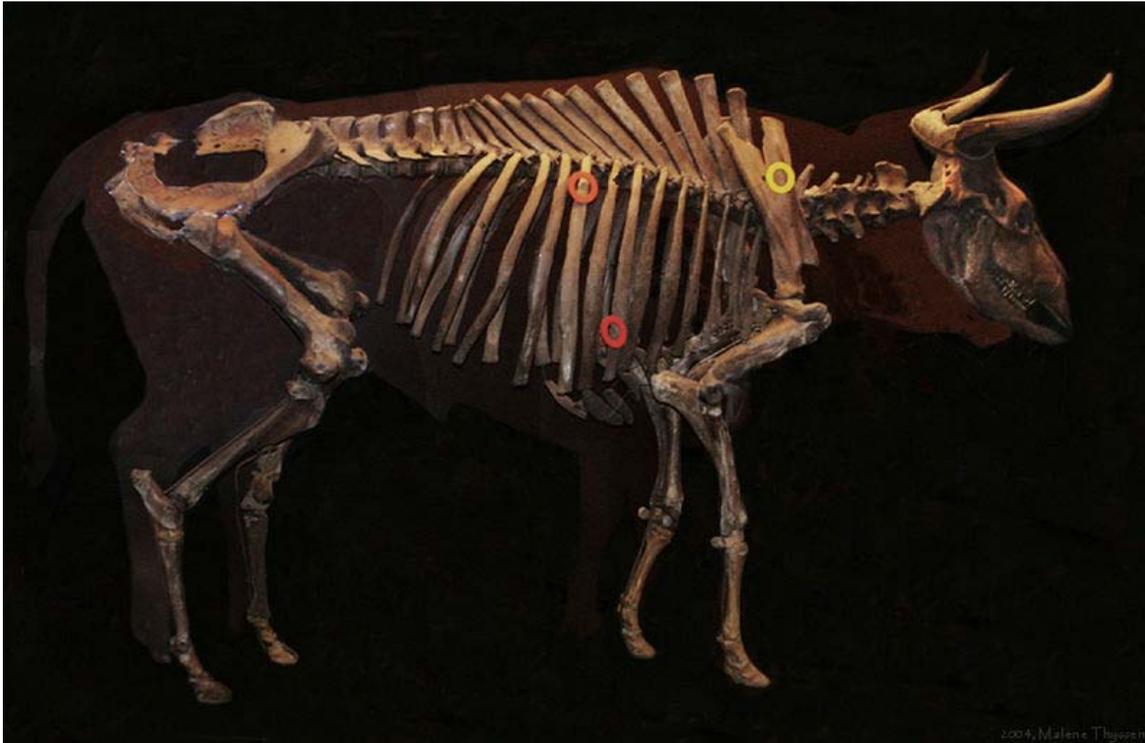
The **aurochs** or **urus** (*Bos primigenius*), the ancestor of domestic cattle, was a type of huge wild cattle which inhabited Europe, Asia and North Africa, but is now extinct; it survived in Europe until 1627.

The aurochs was far larger than most modern domestic cattle with a shoulder height of 2 metres (6.6 ft) and weighing 1,000 kilograms (2,200 lb). The aurochs was regarded as a challenging quarry animal, contributing to its extinction. The last recorded aurochs, a female, died in 1627 in the Jaktorów Forest, Poland, and its skull is now the property of Livrustkammaren in Stockholm.

Aurochs appear in prehistoric cave paintings, Julius Caesar's *The Gallic War* and as the national symbol of many European countries, states and cities such as Alba-Iulia, Kaunas, Romania, Moldavia, Mecklenburg, and Uri. The swiss canton Uri was actually named after this animal species.

Domestication of bovines occurred in several parts of the world but at roughly the same time, about 8,000 years ago, possibly all derived from the aurochs. In 1920, the Heck brothers, who were German biologists, attempted to recreate aurochs. The resulting cattle are known as Heck cattle or Reconstructed Aurochs, and number in the thousands in Europe today. However, they are genetically and physiologically distinct from aurochs. The Heck brothers' aurochs also have a pale yellow dorsal stripe, instead of white.

Nomenclature



This specimen is from around 7500 BC and is one of two very well preserved aurochs skeletons found in Denmark. The Vig-aurochs can be seen at The National Museum of Denmark. The circles indicate where the animal was wounded by arrows.

The words "aurochs", "urus", and "wisent" have all been used synonymously in English. However, the extinct aurochs/urus is a completely separate species from the still-extant wisent.

The animal's original scientific name, *Bos primigenius*, was meant as a Latin translation of the German term *Aurochse* or *Urochs*, which was (possibly incorrectly) interpreted as literally meaning "primeval ox" or "proto-ox". This scientific name is now considered invalid by the Integrated Taxonomic Information System (ITIS), which classifies aurochs under *Bos taurus* – the same species as domestic cattle. In 2003, however, the International Commission on Zoological Nomenclature "conserved the usage of 17 specific names based on wild species, which are pre-dated by or contemporary with those based on domestic forms", confirming *Bos primigenius* for the Aurochs. Taxonomists who consider domesticated cattle a subspecies of the wild Aurochs should use *B. primigenius taurus*; the name *B. taurus* remains available for domestic cattle where it is considered to be a separate species.

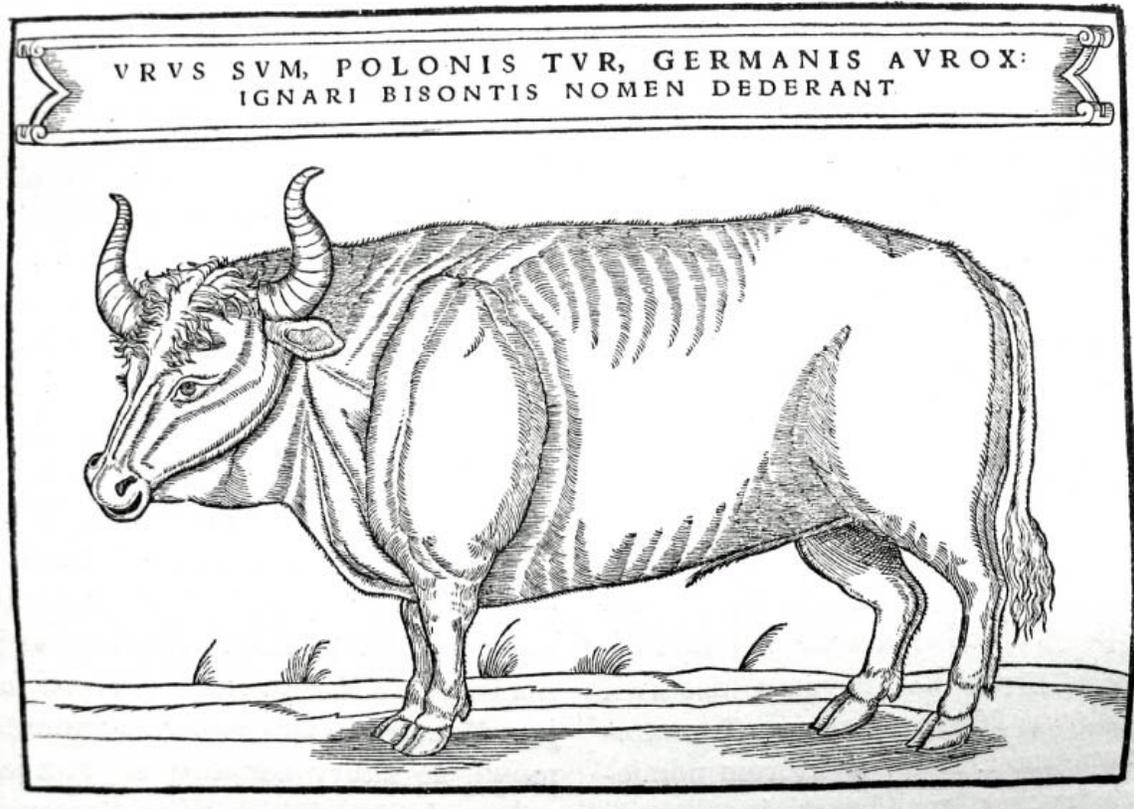


Illustration from Sigismund von Herberstein's book published in 1556 captioned "I'm 'urus', *tur* in Polish, *aurox* in German (dunces call me bison)"; Latin original: *Urus sum, polonis Tur, germanis Aurox: ignari Bisontis nomen dederant*

The word "aurochs" comes to English from German, where its normal spelling and declension today is *Aurochs/Aurochse* (singular), *Aurochsen* (genitive), *Aurochsen* (plural). The declension in English varies, being either "auroch" (singular), "aurochs" (plural) or "aurochs" (singular), "aurochses" (plural). The declension "auroch" (singular), "aurochs" (plural), acknowledged by MWU, is a back-formation analogous to "pea"-from-"pease" derived from a misinterpretation of the singular form ending in the /s/ sound (being cognate to "ox/Ochs(e)"). The use in English of the plural form "aurochsen" is not acknowledged by AHD4 or MWU, but is mentioned in *The Cambridge Encyclopedia of the English Language*. It is directly parallel to the German plural and analogous (and cognate) to English "ox" (singular), "oxen" (plural).

The word "urus" comes to English from Latin, but may have come to Latin from Germanic origins. It declines in English as "urus" (singular), "uruses" (plural).

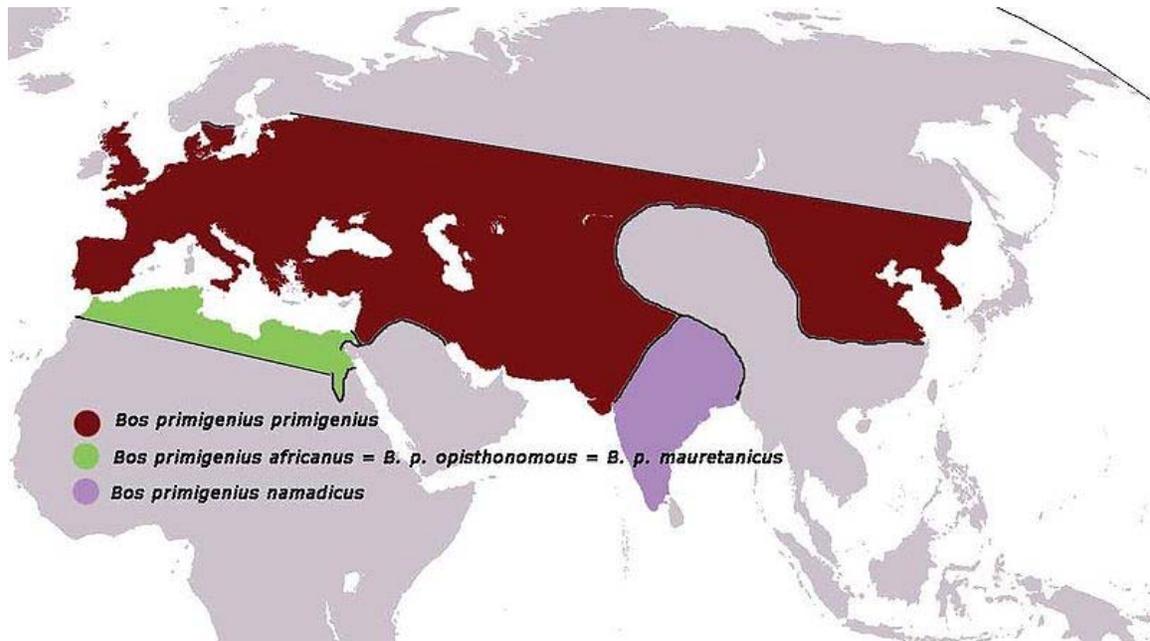
Origin



An aurochs fighting off a Eurasian Wolf pack

According to the Paleontologisk Museum, University of Oslo, aurochs evolved in India some two million years ago, migrated into the Middle East and further into Asia, and reached Europe about 250,000 years ago. They were once considered a distinct species from modern European cattle (*Bos taurus*), but more recent taxonomy has rejected this distinction. The South Asian domestic cattle, or zebu, descended from a different group of aurochs at the edge of the Thar Desert; this would explain the zebu's resistance to drought. Domestic yak, gayal and Javan cattle do not descend from aurochs. Modern cattle have become much smaller than their wild forebears. Aurochs were about 1.75 metres (5 ft 9 in) tall, while a very large domesticated cow is about 1.5 metres (4 ft 11 in) and most domestic cattle are much smaller than this. Aurochs also had several features rarely seen in modern cattle, such as lyre-shaped horns set at a forward angle, a pale stripe down the spine, and sexual dimorphism of coat color. Males were black with a pale eel stripe or finching down the spine, while females and calves were reddish (these colours are still found in a few domesticated cattle breeds, such as Jersey cattle). Aurochs were also known to have very aggressive temperaments and killing one was seen as a great act of courage in ancient cultures.

Subspecies



Map, after Cis Van Vuure's *Retracing the Aurochs: History, Morphology & Ecology of an Extinct Wild Ox*

Three wild subspecies of aurochs are recognized. Only the Eurasian subspecies survived until recent times.:

- The **Eurasian subspecies** (*Bos primigenius primigenius*) once ranged across the steppes and taigas of Europe, Siberia, and Central Asia. It is part of the famous Pleistocene megafauna, and declined in numbers along with other megafauna species by the end of Pleistocene. The Eurasian aurochs were domesticated into modern taurine cattle breeds around the 6th millennium BC, in the Middle East, and possibly also at about the same time in the Far East. Aurochs were still widespread in Europe by the time of the Roman Empire, when they were widely popular as a battle beast in Roman arenas, and excessive hunting began and continued until it was nearly extinct. By the 13th century, aurochs existed only in low numbers in Eastern Europe, and hunting of aurochs became a privilege of nobles, and later royal households. The decreased hunting did not save the aurochs from extinction, and the last recorded live aurochs, a female, died in 1627 in the Jaktorów Forest, Poland from natural causes.
- The **Indian subspecies** (*Bos primigenius namadicus*), the Indian Aurochs, once lived in the hot and dry areas of India. It was the first subspecies of the aurochs to appear, at 2 million years ago, and from it descends the Eurasian Aurochs and the African Aurochs., and from about 9000 BC it was domesticated as zebu cattle.

- The **North African subspecies** (*Bos primigenius mauretanicus*), the African Aurochs, once lived in the woodland and shrubland of North Africa. It is descended from the Indian Aurochs, which migrated from the Middle East. It is unknown when the North African Aurochs became extinct. Prior to its extinction the Ancient Egyptians may have domesticated the African Aurochs into Egyptian cattle, which was the primary breed of cattle in the Mediterranean region until the introduction of zebu from India, which slowly replaced Egyptian cattle in the region.

Behavioral patterns

The recovery pattern of aurochs remains lead to the belief that they preferred swampy and wet wooded areas and, like modern cattle, could swim for short distances enabling them to inhabit islands within their range. Their diet is thought to have consisted of green grass and leaves with occasional tree fruits. Aurochs species were found to have lived on the island of Sicily where once there was a land bridge to Italy. After disappearance of the land bridge, Sicilian aurochs evolved to a size 20% smaller than their mainland relatives. Although the European bison prefers drier forest they would most certainly have lived in areas overlapping aurochs territory. Little else is known about Aurochs habits. Although they survived until the 17th century in Poland, they were in competition with modern cattle for food and hunted by humans contributing to their extinction.

Genetics

The first complete mitochondrial genome (16,338 base pairs) DNA sequence analysis of *Bos primigenius* from an archaeologically-verified and exceptionally-well preserved aurochs bone sample was published in 2010.

Domestication and extinction



Skull of an aurochs



Monument to the last aurochs in Jaktorów, Poland

The now-extinct aurochs *Bos primigenius*, which ranged throughout much of Eurasia and Northern Africa during the late Pleistocene and early Holocene, is widely accepted as the wild ancestor of modern cattle. Archaeological evidence shows that domestication of this formidable animal occurred independently in the Near East and the Indian subcontinent between 10,000–8,000 years ago, giving rise to the two major domestic taxa observed today — humpless *Bos taurus* (taurine) and humped *Bos indicus* (zebu), respectively. This is confirmed by genetic analyses of matrilineal mitochondrial DNA sequences, which reveal a marked differentiation between modern *Bos taurus* and *Bos indicus* haplotypes, demonstrating their derivation from two geographically- and genetically-divergent wild populations.

Domestication of the aurochs began in the southern Caucasus and northern Mesopotamia from about the 6th millennium BC, while genetic evidence suggests that aurochs were independently domesticated in India and possibly in northern Africa. Domesticated cattle and aurochs are so different in size that they have been regarded as separate species; however, large ancient cattle and aurochs "are difficult to classify because morphological traits have overlapping distributions in cattle and aurochs and diagnostic features are identified only in horn and some cranial element."



Aurochs horn from 200,000 years BP found near Madrid (Spain)

Comparison of aurochs bones with those of modern cattle has provided many insights about the aurochs. Remains of the beast, from specimens believed to have weighed more than a ton, have been found in Mesolithic sites around Goldcliff, Wales. Though aurochs became extinct in Britain during the Bronze age, analysis of bones from aurochs that lived in the same age as domesticated cattle there showed no genetic contribution to modern breeds. As a result of this study, modern European cattle were thought to have descended directly from the Near East domestication. Another study, however, found distinct similarities between modern breeds and Italian aurochs specimens suggesting that the previously-tested British aurochs were not a good model of the diversity of aurochs genetics and suggesting possible North African and European aurochs input to domestic breeds.

Indian cattle (zebu), although domesticated eight to ten thousand years ago, are related to aurochs which diverged from the Near Eastern ones some 200,000 years ago. African cattle are thought to descend from aurochs more closely related to the Near Eastern ones. The Near East and African aurochs groups are thought to have split some 25,000 years ago, probably 15,000 years before domestication. The "Turano-Mongolian" type of cattle now found in Northern China, Mongolia, Korea and Japan may represent a fourth domestication event (and a third event among *Bos taurus*-type aurochs). This group may have diverged from the Near East group some 35,000 years ago. Whether these separate genetic populations would have equated to separate subspecies is unclear.

The maximum range of the aurochs was from Europe (excluding Ireland and northern Scandinavia), to northern Africa, the Middle East, India and central Asia. By the 13th century A.D., the aurochs' range was restricted to Poland, Lithuania, Moldavia,

Transylvania and East Prussia. The right to hunt large animals on any land was restricted to nobles and gradually to the royal household. As the population of aurochs declined, hunting ceased but the royal court still required gamekeepers to provide open fields for the aurochs to graze in. The gamekeepers were exempted from local taxes in exchange for their service and a decree made poaching an aurochs punishable by death. In 1564, the gamekeepers knew of only 38 animals, according to the royal survey. The last recorded live aurochs, a female, died in 1627 in the Jaktorów Forest, Poland from natural causes. The skull was later robbed by the Swedish Army during the Swedish invasion of Poland (1655–1660) and is now the property of Livrustkammaren in Stockholm. The causes of extinction were hunting, a narrowing of habitat due to the development of farming, climatic changes and diseases transmitted by domestic cattle.

Re-creation



Heck cattle

In the 1920s two German zoo directors (in Berlin and Munich), the brothers Heinz and Lutz Heck, began a selective breeding program in the attempt to breed the aurochs back into existence from the domestic cattle that were their descendants. Their plan was based on the concept that a species is not extinct as long as all its genes are still present in a living population. The result is the breed called *Heck cattle*, "Recreated Aurochs", or "Heck Aurochs", which bears some resemblance to what is known about the *appearance* of the wild aurochs.

Scientists of the Polish Foundation for Recreating the Aurochs (PFOT) in Poland want to use DNA from bones in museums to recreate the aurochs and return this animal to the forests of Poland. The project has gained the support of the Polish Ministry of the Environment. They plan research on ancient preserved DNA. Other research projects have extracted "ancient" DNA over the past twenty years and their results published in such periodicals as *Nature* and *Proceedings of the National Academy of Sciences USA*. Polish scientists believe that modern genetics and biotechnology make recreating an animal almost identical to aurochs possible. They say this research will lead to examining the causes of the extinction of the aurochs, and help prevent a similar occurrence with domestic cattle.

In a similar program, Project Tauros is trying to DNA sequence breeds of modern cattle to find gene sequences which match those found in "ancient DNA" from aurochs samples. The modern cattle would then be selectively bred to try to bring the aurochs-type genes back into a single animal. Johan van Arendonk, a professor of animal-breeding and genetics at Wageningen University is quoted as saying, "It's still a very open question if it all can be done."

Art, history, mythology, and media



Aurochs in a cave painting in Lascaux, France.



Sculpture of aurochs (*tarvas*) in Rakvere, Estonia.



Possible version of a Moldavian princely flag in use during the time of Stephen the Great

- Aurochs are depicted in many Paleolithic European cave paintings such as those found at Lascaux and Livernon in France. Early carvings of the aurochs have also been found. The impressive and dangerous aurochs survived into the Iron Age in Anatolia and the Near East, and was worshipped throughout that area as a sacred animal, the Lunar Bull, associated with the Great Goddess and later with Mithras.
- A 1999 archaeological dig in Peterborough, England, uncovered the skull of an aurochs. The front part of the skull had been removed but the horns remained attached. The supposition is that the killing of the aurochs in this instance was a sacrificial act.
- Aurochs are depicted on the Ishtar Gate.
- The ancient name of the Estonian town of Rakvere, *Tarwanpe* or *Tarvanpea*, probably derives from *Auroch's head (Tarva pea)* in ancient Estonian. A 3.5m high and 7.1m long Statue of an Aurochs was opened in Rakvere in 2002, for the town's 700th birthday. The sculpture, made by artist Tauno Kangro, has become a symbol of the town.
- The wild-ox called *re'em* (Strong's # 07214) in the Bible (Numbers 23:22 and 24:8, Deuteronomy 33:17, Job 39:9–10, Psalms 22:21, 29:6, 92:10 and Isaiah 34:7) is occasionally associated with the aurochs and has incorrectly been translated as "unicorn" in the past.
- Julius Caesar wrote about aurochs in *Gallic War* Chapter 6.28, "...those animals which are called uri. These are a little below the elephant in size, and of the appearance, color, and shape of a bull. Their strength and speed are extraordinary; they spare neither man nor wild beast which they have espied. These the Germans

take with much pains in pits and kill them. The young men harden themselves with this exercise, and practice themselves in this sort of hunting, and those who have slain the greatest number of them, having produced the horns in public, to serve as evidence, receive great praise. But not even when taken very young can they be rendered familiar to men and tamed. The size, shape, and appearance of their horns differ much from the horns of our oxen. These they anxiously seek after, and bind at the tips with silver, and use as cups at their most sumptuous entertainments."

- An aurochs head, the traditional arms of the German region Mecklenburg, is included in the coat of arms of Mecklenburg-Vorpommern. The aurochs ("bour" in Romanian, probably derived from lat. *bos urus* → *bourus* → *bour*) was also the symbol of Moldavia; nowadays they can be found in the coat of arms of both Romania and Moldova. The horn of the aurochs is a charge of the coat of arms of Tauragė, Lithuania. It is also present in the emblem of Kaunas, Lithuania, and was part of the emblem of Bukovina during its time as a *Kronland* of Austria-Hungary. The Swiss Canton of Uri is named after the aurochs; its yellow flag shows a black aurochs head.
- East Slavic surnames Turenin, Turishchev, Turov, Turovsky originate from the East Slavic name of the species (Tur).
- Turopolje, a large lowland floodplain south of the Sava river in Croatia, got its name after the once abundant aurochs (Croatian: tur).

Chapter- 5

Bluebuck

The **Bluebuck** or **Blue Antelope** (*Hippotragus leucophaeus*), sometimes called **Blaubok**, is an extinct species of antelope, the first large African mammal to disappear in historic times. It is related to the Roan Antelope and Sable Antelope, but slightly smaller than either. It lived in the southwestern coastal region of South Africa savannahs, but was more widespread during the last glacial. It was probably a selective feeder, preferring high-quality grasses.

Europeans encountered the Bluebuck in the 17th century, but it was already uncommon by then. European settlers hunted it avidly, despite its flesh being distasteful, while converting its habitat to agriculture. The Bluebuck became extinct around 1800. There are only four mounted specimens – in museums in Vienna, Stockholm, Paris, and Leiden – along with some bones and horns elsewhere. None of the museum specimens show a blue colour, which may have derived from a mixture of black and yellow hairs.



Bluebuck Drawing of a Bluebuck from 1778 by Allamand, based on the stuffed type specimen.

Characteristics



Illustration of a Bluebuck and a Klipspringer from 1851.

Total length: 250–300 cm (8.2–9.8 ft) (bull); 230–280 cm (7.5–9.2 ft) (cow)

Shoulder height: 100–120 cm (3.3–3.9 ft)

Skull length: 396 mm (15.6 in)

Horn length: 50–61 cm (20–24 in)

Body mass: 160 kg (350 lb)

Eighteenth century travellers provided contradictory descriptions of this species, perhaps because some were embellishing, while others had not actually seen it and were simply repeating hearsay - Peter Kolb in 1719 incorrectly described it as having a long goat-like beard and tail, straight horns like an oryx, and short ears. They did send some skulls and skins back to Europe. In 1967, Erna Mohr reported that the four existing mounted blue antelopes vary from 102 to 116 cm (3.35 to 3.81 ft) at the shoulder. Adult Bluebuck probably rarely exceeded 160 kg (350 lb). None of the four museum specimens show any sheen of blue. The dark skin showing through the thinning fur of older animals may have caused the blue colours described by several authors or the mix of black and yellow hairs.

Like most antelopes, the Bluebuck had six teeth along the cheek in each half of the upper and lower jaws. These formed two distinct series three premolars immediately followed by three molars. Its remains can be distinguished from those of the roan by smaller molars and premolars, and from the sable by larger premolars, and a higher ratio of premolar row length to molar row length.

The Bluebuck was a large, horse-like antelope, as heavy as a Javan or English horse, but smaller than the roan or sable. The proportions of its body were similar to that of the southern reedbuck.

It had a relatively long, strong neck with a very short, underdeveloped mane, long white legs with dark bands on the anterior, and a long tail, up to the hock, with a dark, horse-

like whisk. It had a long muzzle. Its ears were long and donkey-like, rufous and narrow-pointed, without the black tufts of hair found in the roan.

The long, scimitar-shaped horns inserted directly above the orbits, extending upwards at almost right angles to the skull, and then curving back gently, without any torsion, towards the shoulders. These horns were heavily ridged, with 20-35 rings up to the tip of the horn, comparable to the roan (20-50 rings). Its horns were however more lightly built than those of the roan and sable, and slightly transversely compressed to the inside. The back-curved horns reminded Jan van Riebeeck of the European ibex, and he called it the 'steinbok'. It remains uncertain how long this name was used, or when it was changed to 'blaauwbok' or Bluebuck.

Its hair was short and glossy, and of a delicate light blue to grey - which quickly faded to a bluish grey after death. Its belly was pale white, and didn't actually contrast with the colour of the flanks. Its forehead and the upper muzzle was brown, becoming lighter towards the cheeks and upper lips. It had distinct white patches in front of the eyes not reaching the white muzzle.

The bulls resembled the cows up to the age of three years, after which they became paler (almost white) and developed large, more curved horns; the horns of the cows were more or less of the same length, although thinner and 10-20% smaller. The calves younger than 2 months were light tan, with no or very indistinct markings.

Range

When the Europeans settled in the Cape Colony in the 17th and 18th century, they found the Bluebuck on the coastal plains of the southwestern Cape Province, east of the Hottentots Holland mountains. It was never very common, and was probably restricted to a grassland area of less than 4 000 km² in the triangle formed by the towns of Caledon, Swellendam and Bredasdorp, South Africa. Lieutenant W.J. St. John also recorded 'roans' of a bluish grey colour at Liebenbergsvlei (28°15'S, 28°29'E) near Bethlehem in the Free State Province on 28–29 July 1853, and it is now thought that he actually saw the last remnants of a relict population of Bluebuck.

From archaeological and palaeontological evidence it is known that the Bluebuck had a wider distribution, and was more common, during the early Holocene Epoch 10,000 years ago. At one time it could be found on the coastal plain of the Cape Province from Elands Bay in the northwest to Uniondale in the east. Researchers of the National Museum in Bloemfontein have found San (Bushman) rock paintings near Ficksburg and Golden Gate Highlands National Park, while Pleistocene deposits (100 000 to 10 000 years ago) confirm its existence at Rose Cottage cave near Ladybrand.

Habitat

The early travellers found the Bluebuck only in rolling grassland with extensive marshes and open areas with medium to long (0,5-1,5 m), perennial tuft grass and little hillside shrub. It was also at home at higher elevations, up to 2 400 m above sea-level. It was susceptible to droughts, and water was a necessary habitat requirement.

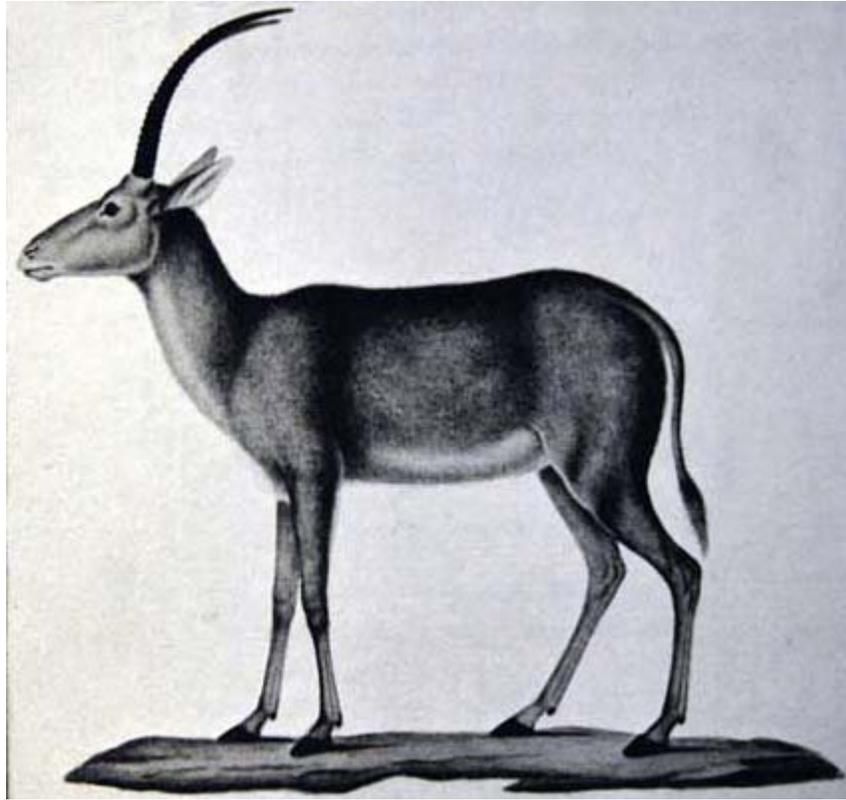
They avoided areas with short grass and woodland where trees formed a thick canopy or thickets. Habitat change, due to overgrazing of grassland by other species, like sheep, thus threatened this species.

Food

Like the roan and sable, it had to drink daily. Many other antelopes can obtain the moisture they need from the plants they eat and they can go for long periods without drinking.

The Bluebuck was a selective grazer of medium to long (0.5-1.5 m), perennial tuft grasses, like high-quality red grass (*Themeda triandra*), spear grass (*Heteropogon contortus*), buffalo grass (*Panicum* spp.) and love grass (*Eragrostis* spp.). Unlike most other antelope, it was not particularly attracted to fresh grass, except during the dry season, when it would graze for short periods along drainage-lines and on floodplains on the fresh growth following the yearly fires. However, like most grazers, it would probably browse during the dry season.

Behavior



Drawing from 1781, by Le Vaillant

Most of its activities took place during the day, especially early in the morning and late in the afternoon.

Bluebucks followed the conventional territorial system among the Hippotragini or 'horse antelopes': territorial bulls, herds of cows and calves, and bachelor herds which were kept segregate by the territorial bulls.

Bluebuck cows and calves lived in small to medium-sized herds of 5 to 20 individuals, although herds of 35 to 80 was not unusual. They normally occurred at a low density of about $4/\text{km}^2$. Cows shared a traditional home range, which included the territories of several bulls and occupied it for up to 30 years. At very low densities in substandard habitat the cows ranged across larger areas, and were accompanied by the same bull, which in the absence of resistance by territorial neighbours, defended a movable space around his own private harem.

Because they were equipped with long, dangerous horns, cows tended to be more aggressive than those antelope whose females are hornless. Dominance hierarchies based on age and individual prowess were vigorously maintained by both sexes. Maternal herds, composed of animals that shared the same home range, were closed to outsiders. Herd members kept out of range of each other's horns, by increasing the individual space between them.

Herd composition changed daily and seasonally; members split into small groups during the rainy season, and concentrated into larger groups on the best available grazing near water during the dry season. The most cohesive groups were maintained by calves of different ages, which clustered around the youngest calf and usually lagged behind the herd.

Bulls were accepted in the natal herd up to the age of 15–18 months, which was unusually long. Until then, their similarity to cows suppressed the aggression of the territorial bulls. Subadult bulls were driven from the herd, and if these juveniles didn't escape quickly enough, they were killed. They then joined bachelor herds, where they stayed until they reached five or six years of age, when they would be strong enough to defend their own territory.

The adult bull would advertise his presence and high social status by standing or lying alone or away from the herd, at a conspicuous place. The bull stood in an erect manner, which was a sign of high status, and it was self-advertising if it was not directed. When another bull approached his herd, the dominant bull would stand with his neck arched, head high, and ears turned sideways. Unless the intruder showed submission by lowering his head, the bull kept his ears erect, and waved his tail or tucked it between his legs, and a clash of horns and head-butting would take place. Its sound was a blowing snort.

Reproduction

One calf, with a birth mass of 12–14 kg, was dropped after a gestation period of 268–281 days at any time of the year, with a peak during late summer. Bluebuck are thought to have lived for up to 18 years.

Predators

The calves were vulnerable to attacks from spotted hyenas (*Crocuta crocuta*), leopards (*Panthera pardus*) and wild dogs (*Lycaon pictus*). The adults were large and formidable, and resistant to predation in areas with low predator densities. They did sometimes fall prey to lions (*Panthera leo*), but were attacked with caution. Normally they would flee from predators, but when wounded, a bluebuck would lay down, preferably in a marsh, and defended itself with its razor-sharp horns - the angle-horn threat display indicating that it intended to stab sideways or over its shoulder.

History and population

The Bluebuck or Blue Antelope was the first large African mammal to become extinct in historical times.

Shortly after the last Ice Age, about 10 000 years ago, the Bluebuck must have been common in the far south of Africa, which was largely covered with grassy plains. Numerous finds of subfossil bones indicate a former distribution area from Elands Bay in

the present Cape Colony to about 25° E at Uniondale, as well as in the Eastern Free State. Bluebuck numbers dropped about 3 200-2 000 years ago, due to the change of grassland into bush and forest when the climate became warmer.

They showed a sharp decline around 400 A.D., which coincided with the introduction of livestock, particularly sheep, by man at about that time. Competition for grazing with sheep, the resulting habitat degradation due to overgrazing, and diseases may all have contributed to a decline in Bluebuck. Subsistence hunting could also have played a role - it is known that the Late Stone Age inhabitants of Rose Cottage cave hunted several game species, including Bluebuck. To the San (Bushman) the Bluebuck was an important animal, since rock art indicates that these animals contained supernatural power.

Jan van Riebeeck mentioned a "steinbok" or ibex with back-curved horns near Cape Town, while the German Peter Kolb was the first to write about the existence of a "blaaubok" or Bluebuck in 1719. The Bluebuck was clearly on its way to extinction when European naturalists and hunters finally discovered it. Its range was already small when Europeans who settled in the Cape Colony in the 17th and 18th century first saw this antelope. The Swedish naturalist Carl Peter Thunberg noted in 1774 that these animals were becoming rare. European hunters and farmers hunted it mainly for its skin. Its meat was not fatty, and generally fed to the dogs, although it was just as tasty as that of deer. According to the German zoologist Martin Lichtenstein, the last Bluebuck in the Cape Province was killed in 1799/1800 in the Swellendam district. However, there is good evidence to suggest that an isolated remnant population still existed further north in the 18th century, and that the last Bluebuck died in the Eastern Free State more than fifty years later.

Extinction



A Bluebuck on display in the Naturhistorisches Museum Wien.

Cultivation of the Cape Colony and hunting with firearms quickly destroyed the last small herds. The Bluebuck disappeared before the early natural history cabinets and museums had a chance to obtain a fair number of specimens.

Museum specimens

There are four mounted Bluebuck skins: in the National Museum of Natural History “Naturalis” in Leiden (the Netherlands), and in the natural history museums of Stockholm (Sweden), Paris (France) and Vienna (Austria). Not counting the many bones excavated throughout the species' former range, there are two skulls, in Amsterdam (the Netherlands) and Glasgow (United Kingdom), and three pairs of horns, in Uppsala

(Sweden), London (United Kingdom) and Cape Town (South Africa). None of these specimens are properly documented. .

Relatives

Two close relatives of the Bluebuck are the roan antelope (*Hippotragus equinus*) and the sable antelope (*Hippotragus niger*). Although some naturalists in the past classified the Bluebuck merely as a subspecies of the roan, it is now generally accepted as a separate species. This is based on the fact that Bluebuck and roan occurred in sympatry on the coastal plain of the southwestern Cape from Oakhurst to Uniondale during the early Holocene.

There were a lot of speculations that the Giant or Giant Sable Antelope (*Hippotragus niger variani*) had become extinct. There had been unconfirmed sightings in recent years, but no confirmed sightings for 20 years. This subspecies of the Sable Antelope only occurred in Angola, and there are no specimens present in zoos.

An expedition headed to Angola on 14 August 2002 to search for the giant sable antelope. The expedition had tried hunting for the antelope by helicopter, but the animals avoid sound at all costs. Interviews with tribal chiefs revealed that locals often sighted the animals in the Luando reserve, so the expedition changed tactics and carried out ground surveys on foot. They recorded five separate sightings but were not able to take any photographs. These five animals were spotted in Cangandala National Park in Malanje province in north-central Angola by a team led by Professor Wouter van Hoven of the University of Pretoria.

Chapter- 6

Extinct Artiodactyls

Caucasian Wisent

The **Caucasian Wisent** (*Bison bonasus caucasicus*) was a subspecies of Wisent that inhabited the Caucasus Mountains of Eastern Europe.

It was hunted by the Caspian Tiger and the Asiatic Lion (until 10th century) in the Caucasus, as well as other predators such as wolves and bears.



Caucasian Wisent An image of a killed Caucasian Bison from E. Demidoff's book 'Hunting Trips in The Caucasus' (1889)

Decline and extinction

In the 17th century, the Caucasian wisent still populated a large area of the Western Caucasus. After that human settlement in the mountains intensified and the range of the Caucasian wisent became reduced to about one tenth of its original range at the end of the 19th century. In the 1860s the population numbered still about 2000, but was reduced to only 500-600 in 1917, and only 50 in 1921. Local poaching continued and in 1927, the three last Caucasian bison were killed .

Hybrid survivors



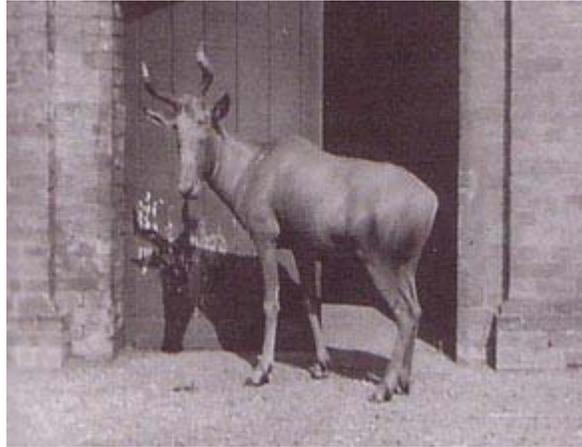
A hybrid in Poznań New Zoo

Only one Caucasian bison bull is known to have been in captivity. This bull, named *Kaukasus*, was born in the Caucasus Mountains in 1907 and brought to Germany in 1908 where it lived until 26 February 1925. While in captivity it bred with cows from the Lowland subspecies *Bison bonasus bonasus*. Thus it became one of the 12 ancestors of the present Lowland-Caucasian breeding line of the European wisent pedigree book.

Wisent reintroductions in the Caucasus

In 1940, a group of wisent-American bison hybrids were released into the Caucasian Biosphere Reserve and later in 1959 in the Nalchik Forestry Game Management Unit (Kabardino-Balkariya). Later some pure-blood wisent of the Lowland-Caucasian breeding line were released there to form a single mixed herd together with the hybrids. In 2000, these hybrids are described as a different (although questionable) subspecies, the Highland bison *Bison bonasus montanus*.

Bubal Hartebeest



A female Hartebeest that lived in London Zoo from 4 October 1883 until 27 April 1897. Photographed by Lewis Medland in 1895.

The **Bubal Hartebeest** (*Alcelaphus buselaphus buselaphus*) is an antelope that became extinct in 1923.

The name Hartebeest is an Dutch word (originally spelled hertebeest) which means deer. The Bubal Hartebeest stood at around 122 cm (4 ft) at the shoulder. It also had lyre-shaped horns. The Bubal Hartebeest is believed to have once lived in Algeria, Egypt, Libya, Morocco and Tunisia. It may also have resided in the Middle East. The Hartebeest was once domesticated by Egyptians and may have been used as a sacrificial animal. Its horns in tombs at Abadiyeh indicated its importance as a food source and in mythology. It is even mentioned in the Old Testament under the name Yachmur (1 Kings 4:23). Starting in the 1900s the Bubal Hartebeest could only be found in Algeria and the Moroccan High Atlas. French people who resided in Morocco had shot these animals for fun, and for hunting, which kill large herds of them out. Many Hartebeests were captured and were kept alive (e.g. in the London Zoo from 1883 to 1907), but they eventually died out. In 1923, a Bubal Hartebeest female that died in a Paris Zoo is believed to have been that last one remaining.

The Dutch name for the Bubal Hartebeest is Noord-Afrikaans Hartenbeest.

The ancient Egyptians had a hieroglyph meaning "baby hartebeest":

Arabian Gazelle

The **Arabian gazelle** (*Gazella arabica*) was an elusive gazelle that was hunted to extinction in its Middle Eastern homeland, Saudi Arabia. It is only known from a single specimen collected on the Farasan Islands in the Red Sea in 1825. However, it is highly unlikely that the specimen actually originated from the Farasan Islands, and represented a former population on the island. The gazelles now occurring on Farasan Islands are a subspecies of Mountain Gazelle, which was distinguished from this species from skull characteristics. Since the 1996 IUCN Red List of Threatened Species this species is included as extinct by its Antelope Specialist Group until 2008. Since 2008, the *Arabian Gazelle* is rated as Data Deficient due to the unresolved mystery among the validity of this taxon.

Red gazelle

The **red gazelle** (*Eudorcas rufina*) is an extinct species of gazelle, which lived in northern Algeria and Morocco. Some authorities (e.g. Kingdon 1997), however, consider that it was a subspecies of Red-fronted Gazelle (*E. rufifrons*). The red gazelle was formerly considered a member of the genus *Gazella* within the subgenus *Eudorcas* before *Eudorcas* was elevated to genus status.

It probably lived in the better-watered mountain areas of North Africa rather than in deserts, due to the rich colouring on the coat. The last record dated from before 1894. It is known from three specimens, which were purchased in markets in Algiers and Oran, northern Algeria, in the late nineteenth century. They are held in museums in Paris and London.

Schomburgk's Deer



Specimen in West Berlin Zoo

Schomburgk's Deer (*Rucervus schomburgki*) was a member of the family Cervidae. This deer was endemic to Thailand. Schomburgk's deer was described by Edward Blyth in 1863 and named after Sir Robert H. Schomburgk, who was the British consul in Bangkok from 1857-1864.

This deer was a graceful species similar in appearance to the barasingha. The fur was a dark brown with lighter underparts. The underside of the tail was white. Males possessed basketlike antlers, upon which all the main tines branched. This caused the deer to have up to 33 points on their antlers and the outer edge of the rack to be up to 35 inches long. Females had no antlers.



The mounted specimen in Paris



Close up of the head

Schomburgk's deer inhabited swampy plains with long grass, cane, and shrubs in central Thailand, particularly in the Chao Phraya River valley near Bangkok. This deer avoided dense vegetation. They lived in herds that consisted of a single adult male, a few females, and their young. However, during the flooding that occurred during the rainy season, the herds were forced together upon higher pieces of land which could turn into islands. This made them easy targets for hunters.

Commercial production of rice for export began in the late nineteenth century in Thailand leading to the loss of nearly all grassland and swamp areas this deer depended on. Intensive hunting pressure at the turn of the century restricted the species further until it became extinct.

The wild population of Schomburgk's deer is thought to have died because of overhunting in 1932, with the last captive individual being killed in 1938. The species is also listed as *extinct* in the 2006 IUCN Red List of Threatened Species. However, some scientists consider this species to be still extant. Only one mounted specimen is known to be in existence, which currently resides in Paris's Muséum national d'Histoire naturelle after living in the zoo there until 1868.

In 1991, antlers were discovered in a Chinese medicine shop in Laos. Laurent Chazée, an agronomist with the United Nations, later identified the antlers from a photograph he took as coming from Schomburgk's deer.

Queen of Sheba's Gazelle

The **Queen of Sheba's Gazelle** or **Yemen Gazelle** (*Gazella bilkis*), is an extinct subspecies of the Arabian Gazelle, which is also extinct. It is sometimes regarded as a species in its own right: *Gazella bilkis*. It was found on the mountains and hillsides in Yemen but there have been no sightings of the species since 1951, when five specimens were collected in mountains near Ta'izz, where it was reportedly common at the time.

There have been no further specimens, sightings or reports of this gazelle. Surveys in the area of their former occurrence have failed to find any sign of its presence.

In 1985, a photograph of gazelles was taken in a private collection, Al Wabra Wildlife Farm, in Qatar. Zoologist Colin Groves claims these could possibly be surviving Queen of Sheba's Gazelles. It is not confirmed that these animals truly belong to this species.

Saudi Gazelle

The **Saudi Gazelle**, (*Gazella saudiya*), is an extinct species of gazelle that was once found in the Arabian peninsula. It is extinct due to hunting by humans of its native lands.. It was declared to be extinct in 2008, but it is likely to have disappeared before that.

The Saudi Gazelle once lived in the gravel and sandy plains of North and Western Arabian peninsula. It once occurred widely from Kuwait to Yemen, with most of the records coming from Western Saudi Arabia. The Saudi gazelles are found singly or in groups up to 20.

The Saudi Gazelle was formerly seen as a subspecies of the Dorcas Gazelle, which is why its decline and extinction received so little conversational attention. Recent genetic studies proved its position as a separate species. Apart from genetic differences, the Saudi gazelle also had shorter legs than and was lighter in color.

The species was always rare and declining due to excessive hunting. The species has not been seen for a few decades, and was declared to be Extinct in the Wild in 1980. Recent genetic analysis of all reported specimens of *G. saudiya* in captive collections has shown that these represent different species or hybrids. There are frequent surveys attempting to find pure Saudi gazelles in private owned gazelles and in the wild, but there have been no evidence of surviving individuals. The Saudi gazelle was officially declared to be Extinct by IUCN in 2008.

Pyrenean Ibex

The **Pyrenean Ibex** (*Capra pyrenaica pyrenaica*) is an ibex, one of the two extinct subspecies of Spanish Ibex. The subspecies once ranged across the Pyrenees in France and Spain and the surrounding area, including the Basque Country, Navarre, north Aragon and north Catalonia. A few hundred years ago they were numerous, but by 1900 their numbers had fallen to fewer than 100. From 1910 onwards, their numbers never rose above 40, and the species were found only in a small part of Ordesa National Park, in Huesca.

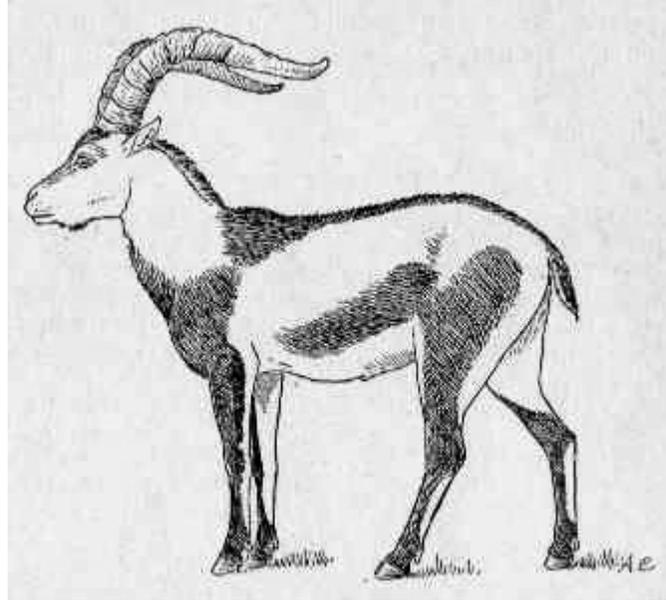
The last natural Pyrenean Ibex, a female named Celia, was found dead on January 6, 2000, apparently killed by a falling tree. Although her cause of death is known, the reason for the extinction of the subspecies as a whole is a mystery. Some hypotheses include the inability to compete with other species for food, infections and diseases, and poaching. The Pyrenean Ibex became the first taxon ever to become "un-extinct" when, for a period of seven minutes in January 2009, a cloned female Ibex was born alive before dying from breathing difficulties.

Pyrenean Ibex



The diet of the Pyrenean Ibex consisted of grass, herbs and lichens. The ibex was paraxonic, with the plane of symmetry of each foot passing between the third and fourth digits. The third and fourth digits were quite large and bore most of the weight.

Cloning project



Drawing of a Pyrenean Ibex from 1914.

The biotechnology company Advanced Cell Technology, Inc. announced on October 8, 2000 that the Spanish government has agreed to their offer to use nuclear transfer cloning technology in collaboration with other scientific partners to clone the Pyrenean ibex from the tissue that was taken in 1999. It was expected to be easier than the cloning experiment of endangered gaur (*Bos gaurus*), as the reproductive biology of goats is better known and the normal gestation period is only five months. ATC has agreed with the government of Aragon that the future cloned Pyrenean Ibexes will be returned to their original habitat.

The project could be of useful conservation value only if multiple goats could be cloned to form a viable gene pool. As it is, cloning one goat will not save the subspecies.

Celia was able to provide perfect tissue samples for cloning. However, attempts to clone Celia have highlighted a major problem: even if it were possible to produce another healthy Pyrenean Ibex, there are no males for the female clone to breed with. One solution could be to cross Celia's clones with males of another subspecies, although the offspring would not be pure Pyrenean Ibex. A more ambitious plan would be to remove one X chromosome and add a Y chromosome from another still-existing subspecies, creating a male Pyrenean Ibex, but such technology does not yet exist and it is not known whether this will be feasible at all without irreparably damaging the cell.

Three teams of scientists, two Spanish and one French, are involved in the cloning project. The project is coordinated by the Food and Agricultural Investigation Service of the Government of Aragon (Spanish: *Servicio de Investigación Agroalimentaria del Gobierno de Aragón*) and by the National Institute of Investigation and Food and Agrarian Technology (*Instituto Nacional de Investigación y Tecnología Agraria y*

Alimentaria). The National Institute of Agrarian Investigation of France is also involved in the project.

First attempt fails

Researchers took adult Somatic cell from the tissue and fused them with oocytes from goats that had their nucleus removed. The resultant embryos were transferred into a domestic goat (*Capra hircus*), to act as a surrogate mother. In 2003, it was announced that the first attempt to clone the Pyrenean Ibex failed. Of the 285 embryos reconstructed, 54 were transferred to 12 mountain goat and mountain goat-domesticated goat hybrids, but only two survived the initial two months of gestation before they too died.

Later attempt

In 2009, one clone was born alive, but died seven minutes later, due to physical defects in the lungs.

Chapter- 7

Extinct Carnivores

Falkland Islands Wolf



Falkland Islands Wolf Illustration by John Gerrard Keulemans (1842-1912)

The **Falkland Islands Wolf** (*Dusicyon australis*), also known as the **Warrah** and occasionally as the **Falkland Islands Dog**, **Falkland Islands Fox** or **Antarctic Wolf**, was the only native land mammal of the Falkland Islands. This endemic canid became extinct in 1876 (on West Falkland island), the first known canid to have gone extinct in historical times. It was the only modern species in the genus *Dusicyon*. Original research supposed that the most closely related genus is *Lycalopex*, including the Culpeo and his domestic forms (perro fueguino, perro yagán), which itself has been introduced to the Falkland Islands in modern times. But 2009 research conducted by a scientific team directed by Graham J. Slater, a post-doctoral researcher at the University of California, Los Angeles, confirmed that the Falkland Island wolf's closest living relative is actually the Maned Wolf (*Chrysocyon brachyurus*) - an unusually long-legged, fox-like South American canid, which it separated from about 6.7 million years ago. It was known from both West and East Falkland, but it is unknown if the varieties were much differentiated.

The fur of the Falkland Islands Wolf had a tawny colour. The tip of the tail was white. The diet is unknown. Due to the absence of native rodents on the Falklands, its diet probably consisted of ground-nesting birds such as geese and penguins, grubs and insects, as well as seashore scavenging. It was sometimes said to have dwelt in burrows.

History

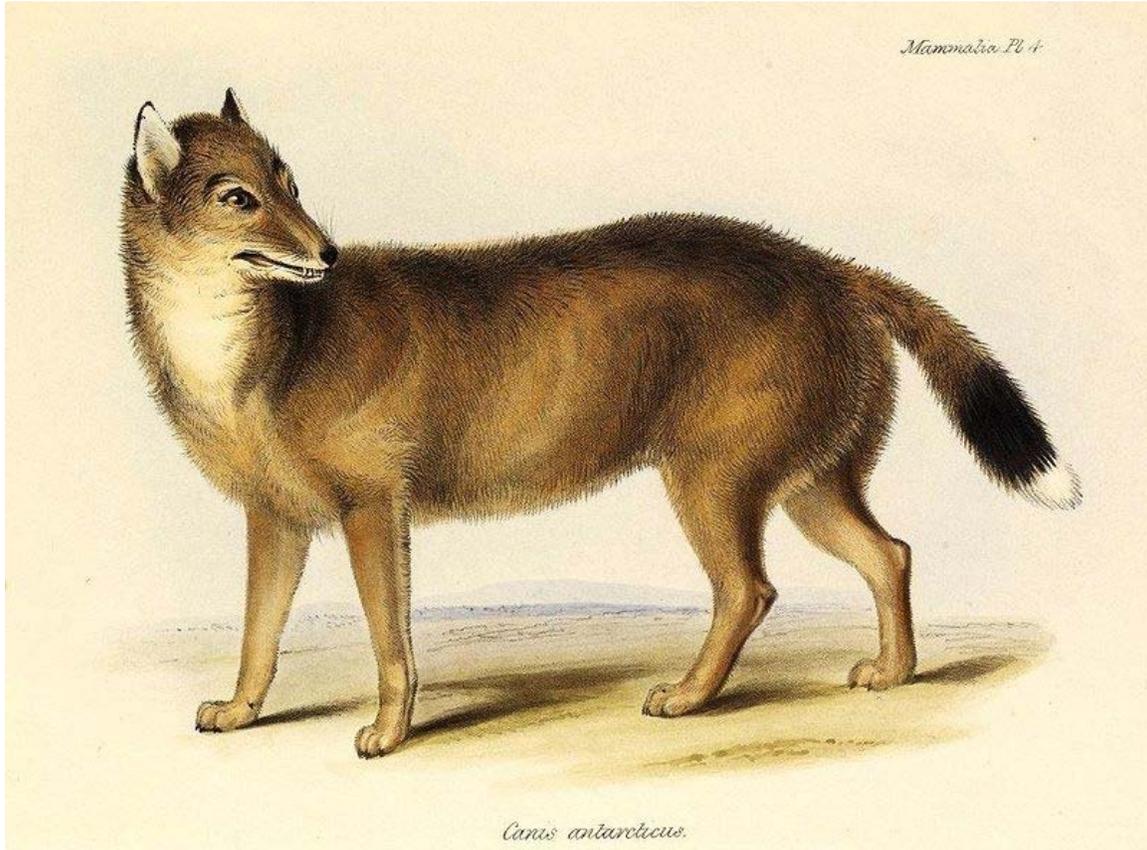


Illustration of "*Dusicyon australis*" from Zoology of the Voyage of H.M.S. Beagle

The first recorded sighting was by Capt. John Strong in 1692. Captain Strong took one of the animals on his ship, but during the voyage back to Europe the creature became frightened by the firing of the ship's cannon and jumped overboard. Louis Antoine de Bougainville, who established the first settlement in the Falkland Islands termed it a *loup-renard* ("fox-wolf"). The name "warrah" is a corruption of the term *aguará* (meaning "fox" in Guaraní, a Native American language), because of its similarity with the Maned Wolf ("*aguará guazú*"). The warrah's Latin name translates into 'foolish dog of the south,' because of its apparent lack of fear of people.

When Charles Darwin visited the islands in 1833 he named the species *Canis antarcticus* and described it as common and tame. However, at the time of his visit the animal was confined to West Falkland and its numbers were in massive decline. He predicted that the animal would join the Dodo among the extinct within "a very few years." The settlers

regarded the wolf as a threat to their sheep and organised poisoning and shooting on a massive scale. The absence of forests led to the speedy success of the extermination campaign. This was facilitated by the animal's tameness, as is common in insular species due to the absence of predators - trappers would lure the animal with a chunk of meat held in one hand, and kill it with a knife or stick held in the other. However, it would defend itself occasionally if it needed to, as Admiral George Grey noted when they landed on West Falkland at Port Edgar (Falkland Islands) on December 17, 1836 -

"I landed in the creek and had hardly put a foot on shore, when one of the foxes of the country was chased by Pilot. I ran up as they were fighting and came to the poor dog's assistance who had nearly met his match, and a rifle ball soon settled the business, but the Pilot had received a terrible bite in the leg."

A live wolf was taken to London Zoo, England in 1868, but survived only a few years. In 1880, post-extinction, Thomas Huxley classified it as related to the Coyote. In 1914, Oldfield Thomas moved it into the genus *Dusicyon*, with the Culpeo and other South American foxes. (These other canids have since been removed to *Lycalopex*.)

Current researchers in 2009, also found that the four Falklands wolf samples that they examined shared a common ancestor at least 70,000 years ago, which suggests that they arrived on the Falkland islands before the end of the last ice age and before humans ever made it into the New World (Graham J. Slater et al. 2009).

Darwin's description

Darwin writing about his 1834 visit to the Falklands in his *Journal and Remarks (The Voyage of the Beagle)* has the following to say of *Canis antarcticus* -

The only quadruped native to the island, is a large wolf-like fox, which is common to both East and West Falkland. Have no doubt it is a peculiar species, and confined to this archipelago; because many sealers, Gauchos, and Indians, who have visited these islands, all maintain that no such animal is found in any part of South America. Molina, from a similarity in habits, thought this was the same with his "*culpeu*"; but I have seen both, and they are quite distinct. These wolves are well known, from Byron's account of their tameness and curiosity; which the sailors, who ran into the water to avoid them, mistook for fierceness. To this day their manners remain the same. They have been observed to enter a tent, and actually pull some meat from beneath the head of a sleeping seaman. The Gauchos, also, have frequently killed them in the evening, by holding out a piece of meat in one hand, and in the other a knife ready to stick them. As far as I am aware, there is no other instance in any part of the world, of so small a mass of broken land, distant from a continent, possessing so large a quadruped peculiar to itself. Their numbers have rapidly decreased; they are already banished from that half of the island which lies to the eastward of the neck of land between St. Salvador Bay and Berkeley Sound. Within a very few years after these islands shall have become regularly settled, in all probability this fox will be classed with the dodo, as an animal which has perished from the face of the earth. Mr. Lowe, an intelligent person who has long been acquainted with these

islands, assured me, that all the foxes from the western island were smaller and of a redder colour than those from the eastern. In the four specimens which were brought to England in the *Beagle* there was some variation, but the difference with respect to the islands could not be perceived. At the same time the fact is far from improbable.

Evolution

When organising his notes on the last stage of the *Beagle* expedition, Darwin wrote of his growing suspicions that the Galápagos Islands mockingbirds and tortoises differed depending on which island they came from:

When I see these Islands in sight of each other, & possessed of but a scanty stock of animals, tenanted by these birds but slightly differing in structure & filling the same place in Nature, I must suspect they are only varieties. The only fact of a similar kind of which I am aware is the constant asserted difference between the wolf-like Fox of East & West Falkland Islds. If there is the slightest foundation for these remarks the zoology of Archipelagoes will be well worth examining; for such facts [would] undermine the stability of Species.

The term "would" was added after the words had been written, suggesting a cautious qualification from his initial bold statement. He later wrote that such facts "seemed to me to throw some light on the origin of species". It has been speculated that the unusual distribution of this animal (the only other canine species native to oceanic islands are the Island Fox of California, and Darwin's Fox of Chile - but these habitats are not as remote as the Falklands) and some details of the skull suggest that it originally arrived with natives visiting the islands and was kept by them as a pet in a semi-domesticated state. If that is true, the progenitor form from mainland South America would have become extinct during the last Ice Age. DNA analysis of museum specimens have proved rather inconclusive as to the exact relationship of this animal, some even suggesting hybridization (during the domestication process) with a relative or progenitor of the Coyote; it is not known whether this would have been biologically possible. Another possibility is that, during an Ice Age, a land bridge between Falkland Islands and South America enabled its ancestors to traverse the distance. At any rate, the Falkland Island Wolf is a biogeographical mystery.

According to a study published in 2009 in the journal *Current Biology*, the Falkland Islands Wolf's closest living relative is the South American Maned Wolf. In the same study it is claimed that DNA evidence points to a common ancestor 6 million years ago. This is an interesting date, since canids did not appear in South America until roughly 3 million years ago in a paleozoogeographical event called the Great American Biotic Interchange, in which the continents of North and South America were connected by the formation of the Isthmus of Panama. The lineages of the Maned Wolf and the Falkland Islands Wolf would thus have diverged already in North America. In any case the results of the study rule out the previous hypotheses of introduction by natives. An earlier study, published in 2003, on the brain anatomy of several canids placed the Maned Wolf and the

Falkland Islands Wolf together, and with zorros of the genus *Pseudalopex* as well, on the ground of their unique morphology of the brain sulci and the prorean gyrus.

Commemorations

Locations:

- Fox Bay, a bay and settlement on West Falkland
- Warrah River, West Falkland

Sea Mink

The **Sea Mink**, *Neovison macrodon*, is an extinct North American member of the Mustelidae family. It is the only mustelid, and one of only two terrestrial mammal species in the order Carnivora, to go extinct in historic times (along with the Falkland Islands Wolf). The body of the sea mink was significantly longer than that of the closely related American Mink (*N. vison*), and also bulkier, leading to a pelt that was almost twice the size of the other species. The longest specimen recorded was said to be 82.6 cm (32.5 in). The fur of the Sea Mink was said to be coarser and redder than the American Mink's, and produced a distinctive odor.

Habitat

It was found along the rocky coasts of New England and Atlantic Canada, as far north as Nova Scotia. It was not a truly marine species, being confined to coastal waters. The Labrador Duck, with which it co-existed, may have been a prey item.

Extinction

Due to its highly prized fur, this mink was hunted to extinction. The animal's remains are often found in Native American shell-heaps around the coasts of the islands of Maine, but while indigenous hunting may have made some contribution to the Sea Mink's decline, it was the competitive European fur trade that led to its extinction.

The last known member of the species was said to have been captured in New Brunswick, Canada, in 1894, although there is some debate if this was a specimen of *N. macrodon* or *N. vison*. The last substantiated report has led to an estimated extinction date of around 1860, although a specimen was reported as sold to a fur-buyer in Maine in 1880.

Although well known to fur hunters, it became extinct before being scientifically described, and therefore little is known about its habits. Existing data suggests it was nocturnal and solitary.

Subspecies

The Sea Mink is sometimes considered a subspecies of the American Mink, in which case the name *Neovison vison macrodon* is used.

Japanese Sea Lion

†Japanese Sea Lion



The **Japanese Sea Lion** (*Zalophus japonicus*) is thought to have become extinct in the 1950s.

Prior to 2003 it was considered to be a subspecies of California Sea Lion as *Zalophus californianus japonicus*. However, it was subsequently reclassified as a separate species. Some taxonomists still consider it as a subspecies of the California Sea Lion. It has been argued that *japonicus*, *californianus*, and *wollenbaeki* are distinct species because of their distant habitation areas and behavioral differences.

They inhabited the Sea of Japan, especially around the coastal areas of the Japanese Archipelago and the Korean Peninsula. They generally bred on sandy beaches which were open and flat, but sometimes in rocky areas.

Currently, several stuffed specimens can be found in Japan and the National Museum of Natural History, Leiden, the Netherlands, brought by Philipp Franz von Siebold. The British Museum possesses a pelt and 4 skull specimens.

Physical description

Male Japanese Sea Lions were dark grey and weighed up to 450 to 560 kg reaching lengths of 2.3 to 2.5 meters; these were larger than male California Sea Lions. Females were significantly smaller at 1.64 meters long with a lighter colour than the males.

Range and habitat

Japanese Sea Lions were primarily found in the Sea of Japan along the coastal areas of the Korean Peninsula, the mainlands of the Japanese Archipelago (the both sides on the Pacific Ocean and Sea of Japan), the Kuril islands, and southern tip of the Kamchatka Peninsula.

Old Korean accounts also describe that the sea lion and Spotted Seal (*Phoca largha*) were found in broad area containing the Bo Hai, the Yellow Sea, and Sea of Japan. The sea lions and seals left a lot of relevant place names all over the coast line of Japan such as Ashika-iwa (アシカ岩, sea lion rock) and Inubosaki point (犬吠崎, lit. dog-barking point) because of the similarity of their howls.

Lifestyle and reproduction

They usually bred on flat, open and sandy beaches but rarely in rocky areas. Their preference was to rest in caves.

Human uses

	<p>△接海鹿、即海獺也。但本草謂、頭如馬者、差耳。紀州有海鹿鳥、多群居、每好眠、上鳥上、爾、唯頭、撿四方者、漁舟來、則誘起、悉轉入水中、潛游甚速、而難捕、其肉亦不甘美、唯熬油為燈油、耳。西國處處亦有之、其聲、似犬、如言於字、蓋海獺海鹿一物、重出、備考合。</p> <p>家集 我戀のあしりをねらふゑそ船のよりミよらそと波間をそ待 仲正</p>	
<p>をつどけせい</p> <p>膾納臍</p> <p>骨納 海狗 膾納 臍 三字同 胡人呼、人曰阿 慈物他、你</p>	<p>海鹿</p> <p>阿之加</p>	

和漢三才圖會卷第三十八 獸類

七十二

Sea lion (right) and fur seal, *Wakan Sansai Zue* (ca. 1712)

Many bones of Japanese Sea Lion have been excavated from shell middens in Jōmon period in Japan while an 18th century encyclopedia, *Wakan Sansai Zue*, describes that the meat was not tasty and they were only used to render oil for oil lamps. Valuable oil was extracted from the skin, its internal organs were used to make expensive oriental medicine, and its whiskers and leathers were used as pipe cleaners and leather goods, respectively. At the turn of the 20th century, they were captured for use in circuses. There were unconfirmed reports that Korean soldiers in World War II stationed at Liancourt Rocks used the sea lions for target practice.

Extinction

Harvest records from Japanese commercial fishermen in the early 1900s show that as many as 3,200 sea lions were harvested at the turn of the century and overfishing caused harvest numbers to fall drastically to 300 sea lions by 1915 and to few dozen sea lions by the 1930s. Commercial harvest of Japanese sea lions ended in the 1940s when the species became virtually extinct. In total, Japanese trawlers harvested as many as 16,500 sea lions, enough to cause their extinction. It is even believed that submarine warfare during World War II contributed to their habitat destruction. The last colony of sea lions sighted were by Korean coast guards in the 1950s with the last confirmed record of *Z. japonicus* being a juvenile captured in 1974 off the coast of Rebun Island, northern Hokkaido.

Population revival efforts

The South Korean Ministry of Environment initiated an effort to search for and reintroduce sea lions to their native habitat in the Sea of Japan. The National Institute of Environmental Research of Korea was commissioned to conduct feasibility research for this project. In 2007, a joint research venture between North Korea, South Korea, Russia, and China was announced. Chinese and Russian waters will be searched for surviving sea lion populations, with hopes of reintroducing the animal to their native habitat. If the animal cannot be found, the South Korean government plans to relocate California sea lions from the United States. The South Korean Ministry of Environment supports the effort because of the symbolism, national concern, the restoration of the ecological system, and possible ecotourism.

Caribbean Monk Seal



Caribbean Monk Seal

The **Caribbean Monk Seal** or **West Indian Monk Seal** (*Monachus tropicalis*) is an extinct species of seal. It is the only seal ever known to be native to the Caribbean sea and the Gulf of Mexico. The last verified recorded sighting occurred in 1952 at Serranilla Bank. On June 6, 2008, after five years of futile efforts to find or confirm sightings of any Caribbean monk seals, the U.S. government announced that the species is officially extinct and the only seal to vanish due to human causes.

A collection of Caribbean Monk Seal bones can be found at the Tropical Crane Point Hammock Museum in Key Vaca.

Physical appearance

The Caribbean Monk Seal was a relatively large seal (1.8-2.7 m) with rolls of fat around its neck and brown pelage that faded to a yellow-white color on the stomach. The soles and palms were naked, with the nails on the anterior digits well developed. The males reached a length of about 3.25 meters and weighed up to 200 kilograms. Displaying sexual dimorphism, the females of this species were generally smaller than males.

Behavior and ecology

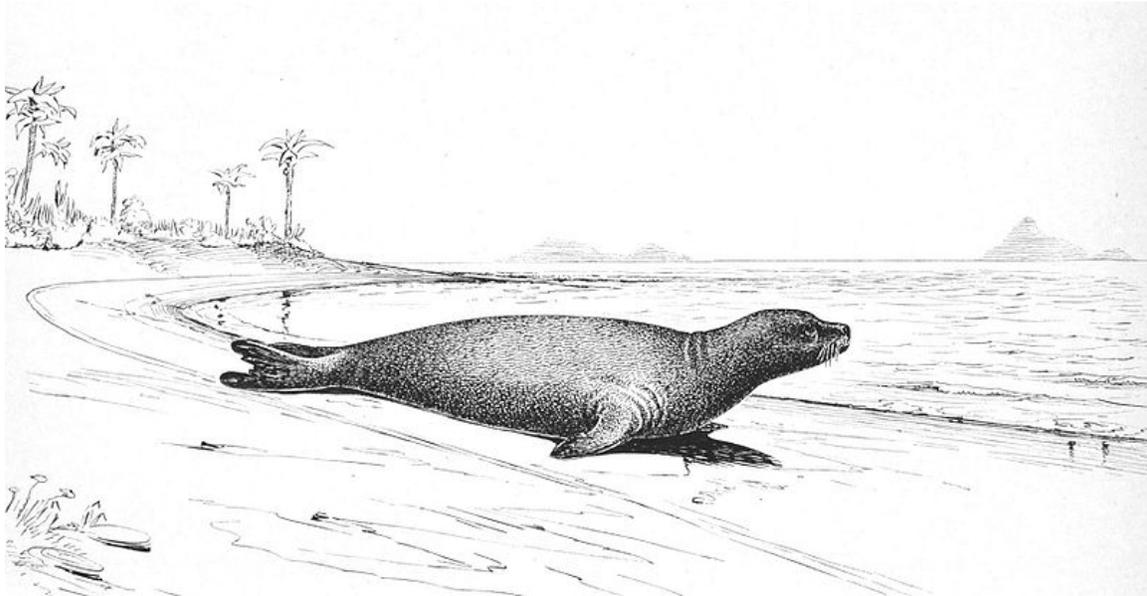
These pinnipeds lived in the marine environment, spending much of their time in the water and occupying rocky and sandy coastlines for shelter and breeding. Their diet included lobsters, octopi, and reef fish.

Like other true seals, the Caribbean Monk Seal was sluggish on land. Its lack of fear for man and an unaggressive and curious nature also contributed to its demise.

Reproduction and longevity

Very little is known about the reproduction behavior and longevity of this animal. Live pups were likely born in early December because several females killed in the Yucatan during this time of the year had well-developed fetuses. It is believed that this animal's average lifespan was approximately twenty years.

History



Drawing of *Monachus tropicalis*.

During his 1494 voyage, Christopher Columbus described the Caribbean Monk Seal as a "sea-wolf." During that voyage, eight seals were killed for their meat. The region was soon colonized, and whatever habitat this species had was lost. People also began exploiting it commercially for its oil, and less frequently, for its meat. It became extinct in the 1950s from lack of food.

Sightings

In the United States, the last recorded sighting of this marine mammal occurred in 1932 off the Texas coast. The very last reliable records of this species are of a small colony at Serranilla Bank between Honduras and Jamaica in 1952.

Unconfirmed sightings of Caribbean Monk Seals by local fishermen and divers are relatively common in Haiti and Jamaica, but two recent scientific expeditions failed to find any sign of this animal. It is possible that the mammal still exists, but some biologists strongly believe that the sightings are of wandering Hooded Seals, which have been positively identified on archipelagos such as Puerto Rico and the Virgin Islands. On April 22, 2009, The History Channel aired an episode of *Monster Quest* which hypothesized that an unidentified sea creature videotaped in the Intracoastal Waterway of Florida's southeastern coast could possibly be the extinct Caribbean Monk Seal. No conclusive evidence has yet emerged in support of this contention, however, and opposing hypotheses asserted the creature was simply a misidentified, yet common to the area, West Indian Manatee.

Bali Tiger



Bali Tiger

The **Bali Tiger** (*Panthera tigris balica*), **harimau Bali** in Indonesian, or referred to as **samong** in archaic Balinese language, was a subspecies of Tiger which was found solely on the small Indonesian island of Bali. This was one of three sub-species of tiger found in Indonesia, together with the Javan Tiger, which is also extinct, and the critically endangered Sumatran Tiger. It was the smallest of the Tiger subspecies.

The last specimen definitely recorded was a female shot at Sumbar Kima, west Bali, on September 27, 1937. However it is thought likely a few animals survived into the 1940s and possibly 1950s. The sub-species became extinct because of habitat loss and hunting. Given the small size of the island, and limited forest cover, the original population could never have been large.

Characteristics

Size



Old male of the Bali tiger

The Bali Tiger was the smallest of all eight Tiger subspecies, rather comparable with the Leopard or Cougar in size. The weight of a male Tiger was usually 90-100 kg (198-221 pounds); that of a female was 65-80 kg (142-175 pounds). The male was approximately 220 cm (7.2 feet or 86.6 inches) in length (together with tail), and the female 195-200 cm (6.4-6.6 feet, 76.8-78.7 inches).

Appearance

Bali Tigers had short fur that was a deeper, darker orange and had fewer stripes than other tiger subspecies. Occasionally, between the stripes, there were small black spots. Bali tigers also had unusual bar-shaped patterns on the head.

Diet

They preyed upon most mammals that lived within their habitat. Their major sources of food were Wild Boar, Rusa Deer, Indian Muntjac, Red Junglefowl, monitor lizards, monkeys and possibly Banteng (the last now also extirpated on the island). The only known predators of Bali Tigers were humans.

Reproduction

Bali Tigers have an average gestation period of 103 days. They give birth to two or three cubs per litter. The average birth weight of a cub is two or three pounds. They are born blind and helpless. Cubs are weaned at roughly one year of age, and are fully independent at 18 months to 2 years of age. Bali Tigers live approximately 8-10 years.

Relationship to the Javanese tiger

There are two common theories regarding the divergence of Balinese and Javan tigers. The first idea suggests that the two subspecies developed when Bali became isolated from Java by formation of the Bali Strait by rising sea levels after the ice age. This split the tigers into two groups which then went on to develop independently.

The second possibility is that the tiger swam from one island to colonize the other. The Bali Strait is only 2.4 kilometers wide, making it well within the swimming ability of the average tiger. Whichever it was, the two went on to become quite different.

Documentation, hunting and tiger culture in Bali



The hunting party of Baron Oskar Vojnich with a Balinese tiger, shot at Gunung Gondol, NW Bali, Nov. 1911

In Balinese culture, the tiger had a special place in folk tales and traditional arts, like in the *Kamasan* paintings of Klungkung kingdom. However, they were perceived as a destructive force and culling efforts were encouraged all the way to the time of extinction.

Very few reliable accounts of encounters and even fewer visual documentations remain. One of the most complete records was left by the Hungarian baron Oszkár Vojnich, who trapped, hunted and took photos of a Balinese tiger. On November 3, 1911 he shot dead an adult specimen in the northwest region, between Gunung Gondol and Banyupoh River, documenting it in his book "In The East Indian Archipelago" (Budapest 1913).

According to the same book, the preferred method of hunting tigers in the island was catching them with a large, heavy steel foot trap hidden under bait (goat or muntjak) and then killing them with a firearm at close range.

A final blow to the island's already low tiger population came during the Dutch colonial period, when shikari hunting trips were conducted by European sportsmen coming from Java, armed with high powered rifles and a romantic but disastrous Victorian hunting mentality. Surabayan gunmaker E. Munaut is confirmed to have killed over twenty Bali tigers in only a few years.



A Balinese tiger shot in 1925, hunting party unknown, likely European hunters with Javanese trackers

The last confirmed tiger sighting was of an adult female, killed on Sep. 27, 1937, at Sumbar Kima, in western Bali. Since then, claims of sighting have been made, but without proof, mostly by forestry officers, in 1952, 1970 and 1972. It is likely that any remaining tigers were pushed to the western side of the island, mostly into area that is now West Bali National Park, established in 1947.

The Balinese tiger was never captured alive on film or motion picture, or displayed in a public zoo, but a few skulls, skins and bones are preserved in museums. The British Museum in London has the largest collection with two skins and three skulls; others include Senckenberg Museum in Frankfurt, Naturkunde Museum in Stuttgart, Naturalis museum in Leiden and Zoological Museum of Bogor, Indonesia, which owns the remnants of the last known Balinese tiger. In 1997 a skull emerged from the old collection of Hungarian Natural History Museum and was scientifically studied and properly documented.

Unlike stag hunting, which they mastered, very few, if any, Balinese embraced tiger hunting before the arrival of Europeans to the island, because tigers were seen as evil, dangerous creatures. Still, tigers had a well defined position in folkloric beliefs and magic. For example, the Balinese considered the ground powder of tiger whiskers to be a potent and undetectable poison for one's foe. According to the same book mentioning this, Miguel Covarrubias's "Island Of The Gods", 1937, when a Balinese baby was born he was given a protective amulet necklace with black coral and "a tiger's tooth or a piece of tiger bone".

Like in other Asian nations, Balinese people are fond of wearing tiger parts as jewelry for status or for spiritual reasons, like power and protection. Necklaces of teeth and claws or male rings cabochoned with polished tiger tooth ivory still exist in everyday use. Since tigers have disappeared on both Bali and neighboring Java, old parts have been recycled,

or leopard and sun bear body parts have been used instead. One of the traditional Balinese dances, the Barong, still preserves in one of its four forms, a type called the Tiger Barong (Barong Macan).

Caspian Tiger



A captive Caspian Tiger, Berlin Zoo 1899

The **Caspian tiger**, also known as the **Persian tiger**, **Turanian tiger**, **Mazandaran tiger** or **Hyrceanian tiger** was found in Iran, Armenia, Azerbaijan, Iraq, Afghanistan, Turkey, Mongolia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan until it apparently became extinct in the late 1950s, though there have been several alleged sightings of the tiger in the more recent years. First thought to have been its own distinct subspecies, genetic research in 2009 proved that the animal was closely related to the Siberian tiger (*P. t. altaica*). Separated by only one letter of genetic code, it is believed that the two split off from each other only in the past century. Some researchers suggest that it may be possible to reintroduce the closely related Siberian Tiger to the Caspian tiger's historical range in hopes of recreating this now-extinct big cat.

Characteristics



Color-enhanced photo of the captive specimen in the Berlin Zoo, 1899

Size

The Caspian tiger's body was generally less massive than that of its Far Eastern cousins, and its average size slightly less. In Turkestan, male tigers exceeded 200 cm in length, though an estimated body length of 270 cm was recorded. Females were smaller in size, normally ranging between 160–180 cm. The maximum known weight was 240 kg. Maximum skull length in males was 297.0-365.8 mm, while that of females was 195.7-255.5 mm. Although tigers from Turkestan never reached the size of the Siberian tiger, there are records of very large individuals of the former population. On January 10, 1954, a tiger killed on the Sumbar in Kopet-Dag had a skull length of 385 mm, which is considerably more than the known maximum for this population and slightly exceeds that of most Far Eastern tigers, though tigers in Manchuria have been recorded as having larger skulls of 406 mm in length.

Pelage



Skin of a tiger from Iran

The main background colour of its pelage varied, though generally, it was brighter and more uniform than that of Far Eastern tigers. The stripes were narrower, fuller and more closely set than those of the Siberian tiger. The colour of its stripes were a mixture of brown or cinnamon shades. Pure black patterns were invariably found only on the head, neck, the middle of the back and at the tip of the tail. Angular patterns at the base of the tail were less developed than those of the Far Eastern populations. The contrast between the summer and winter coats was sharp, though not to the same extent as in Far Eastern populations. The winter coat was paler, with less distinct patterns. The summer coat had a similar density and hair length to that of the Bengal tiger, though its stripes were usually narrower, longer and closer set.

Habitat

In the southeast Trans-Caucasus, the Caspian tiger was mostly confined to the forests of the Talysh lowlands in areas where streams and reed thickets along marine lagoons were adjacent. In Turkmenistan, Uzbekistan and Tajikistan, the tiger favored river and lake basins, densely grown reeds, plume grass or tugai forests consisting of poplar, oleaster and willow. The Caspian tiger was sometimes encountered in montane belts, in summer ascending up to the permanent snowling in Kazakhstan and Kyrgyzstan. Tigers were captured in fir and juniper groves at heights of 2,500-3,000 meters above sea level in Kyrgyz, Trans-Ili and Dzhunarsk Alatau mountains. Generally, the Caspian tiger thrived

in areas with an abundance of wild boar and Bactrian deer, large water supplies, dense thickets and low snow cover.

Diet

In the southeast Trans-Caucasus, the Caspian tiger's main prey was wild boar, though it occasionally fed on roe deer, red deer and domestic animals such as dogs and cattle in winter. Tigers in Iran ate the same species with the addition of gazelle. The Caspian tiger's prey in Turkmenistan, Uzbekistan and Kazakhstan was primarily boar, as well as Bactrian deer. In the lower Amu-Darya River, tigers sometimes preyed on jackals, jungle cats and locusts. On the Zhana-Darya and around the Aral Sea in Kazakhstan, as well as boar, the tiger fed on saiga, goitered gazelle, wild horses, Mongolian Wild Ass and mountain sheep. In Tajikistan and other regions of central Asia, as well as Kazakhstan, tigers frequently attacked dogs, horses and rarely camels. In Baikal, the Caspian tiger fed on wild boar, caucasian wisent, roe deer, Manchurian wapiti, moose and livestock. Like the Siberian tiger, the Caspian tiger rarely became a man-eater, unlike the Bengal tiger.

Genetics

New genetic analysis revealed that the extinct Caspian tiger lives on in the Siberian Tiger (*Panthera tigris altaica*). Researchers from the University of Oxford in the United Kingdom collected tissue samples from 20 Caspian tiger specimens kept in museums across Eurasia. Afterwards, researchers from the U.S. National Cancer Institute (NCI) Laboratory of Genomic Diversity in Frederick, Maryland, sequenced parts of five mitochondrial genes. The Caspian Tiger's mitochondrial DNA is only one letter of genetic code separated from Siberian Tiger DNA, while it is readily distinguishable from the DNA of other tiger subspecies. This indicates that the Caspian and the Siberian subspecies are really one. The scientists have concluded that the two are so similar because both were descended from the same migrating ancestor. The ancestor colonized Central Asia via the narrow Gansu Corridor (Silk Road) from eastern China. The researchers suggest that through the early 20th century, Caspian and Siberian tiger populations intermingled, but hunters subsequently isolated the two groups. This resulted in the Siberian population splitting off from the Caspian population only in the past century.

History and possible extinction

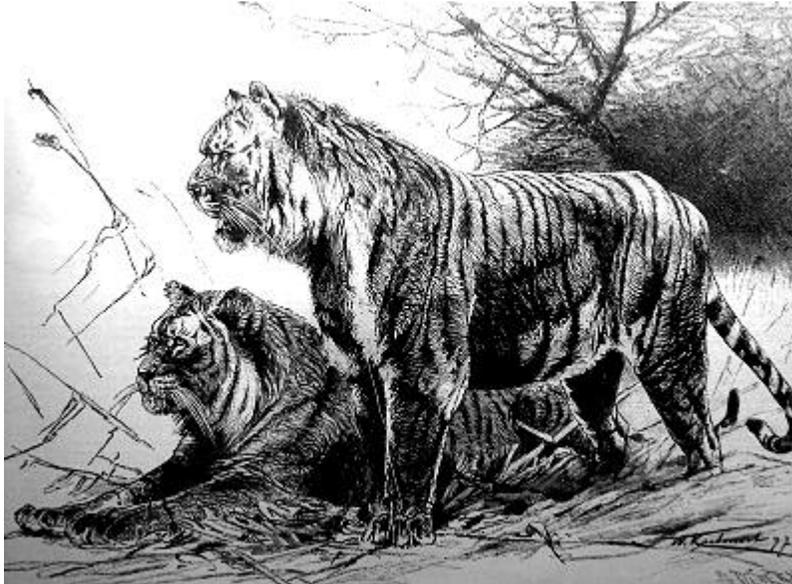


Illustration of two Caspian tigers.



Original distribution of the Caspian tiger

Until the 19th century, Caspian tigers still inhabited wide spaces of Western and Central Asia. In the mid-19th century, Caspian tigers were killed 180 km northeast of Atbasar, Kazakhstan and as far North as near Barnaul, Russia (Ognev 1935, Mazák 1981). The only reported Caspian tiger from Iraq was killed near Mosul in 1887 (Kock 1990). In 1899, the last Caspian tiger near the Lop Nur basin in Xinjiang, China, was killed (Ognev 1935). Caspian tigers disappeared from the Tarim River basin in Xinjiang, China, by the 1920s. (Nowell & Jackson 1996) In 1922, the last known tiger in the Caucasus region was killed near Tbilisi, Georgia, after killing domestic livestock (Ognev 1935). The last record of the Caspian tiger on the Ili River, their last stronghold in the region of Lake Balkhash, Kazakhstan, dates to 1948. (Nowell & Jackson 1996)

The Russian government had worked heavily to eradicate the Caspian tiger during planning a huge land reclamation program in the beginning of the 20th century. They considered there was no room for the tiger in their plans and so instructed the Russian army to exterminate all tigers found around the area of the Caspian Sea, a project that was carried out very efficiently. Once the extermination of the Caspian tiger was almost complete, the farmers cleared forests and planted crops like rice and cotton. Due to intensive hunting and deforestation, the Caspian tiger retreated first from the lush lowlands to the forested ranges, then to the marshes around some of the larger rivers, and finally, deeper into the mountains, until it almost certainly became extinct. In 1938, national park Tigrovaya Balka was opened in Tajik SSR to save Riparian forests and rare animals, including Caspian Tiger, but it didn't help the population of tigers. It was the last stronghold of the Caspian tiger in the Soviet Union. Tigrovaya Balka national park is situated in Tajikistan in the undercurrent of Vakhsh River between the Piandj and Kafirnighan near the border of Afghanistan. The last Caspian Tiger was seen there in 1958.

Some reports state that the last Caspian tiger was shot in Golestan National Park (Iran) or in Northern Iran in 1959 (Vuosalo 1976). However, other reports claim that the last Chinese Caspian tigers disappeared from the Manasi River basin in the Tian Shan mountains, west of Ürümqi, China, in the 1960s. (Nowell & Jackson 1996) The last record from the lower reaches of the Amu Darya river near Lake Aral was an unconfirmed observation near Nukus in 1968 while tigers disappeared from the river's lower reaches and the Pyzandh Valley once a stronghold, in the Turkmen-Uzbek-Afghan border region by the early 1970s (Heptner and Sludskii 1972). (Nowell & Jackson 1996) There are even claims of a documented killing of this subspecies at Uludere, Hakkari in Turkey during 1970 (Üstay 1990; Can 2004). Some reports even state that the final Caspian tiger was captured and killed in Northeast Afghanistan in 1997.

The most frequently quoted date is the late 1950s, but has almost no evidence to back it up. It appears this date came to be accepted after being quoted by H. Ziaie in "*A Field Guide to the Mammals of Iran*". Now, the most evidence reflects an even earlier date of extinction. The area of Iran that contained the last Caspian tigers was in fact the eastern region of Mazandaran, Northern Iran. According to E. Firouz in "*A Guide to the Fauna of Iran, 1999*", the last tiger was killed in 1947 near Agh-Ghomish Village, 10 km East of Kalaleh, on the way to Minoodasht-Bojnoord. An exact date of extinction is unknown.

According to unanimous scientific opinion, the Caspian tiger, as a distinct population has been extinguished irreversibly. According to the confirmed official data and supported by the scientific researches (Heptner and Sludskiy, 1972) during 1900-1968 there were 9 tigers killed in Kopet Dag Mountains. According to scientists (Dement'yev and Rustamov) the last tiger was killed on 10 January 1954 at surroundings of Kone-Kosir in the valley of Sumbar River in Kopet Dag Mountains.

Sightings and doubts about extinction

Possible Turkish last sighting

The following excerpts are taken from "Can, O.E. 2004. Status, Conservation and Management of Large Carnivores in Turkey. Council of Europe. 29 pages. Strasbourg, France".

"Earlier in the 20th century, the presence of the Caspian tiger had been known by Turkish (Turkish Republic Official Gazette, 1937). Yet, when the Caspian tiger was declared extinct in the world, international zoologists did not accept the idea that the Caspian tiger distribution range extended as far as eastern Turkey (Dr. George Schaller, Ankara, Turkey, personal communication, 2003). In fact, the species was officially a pest species until July 11, 2004 in Turkey. In the 1970s, surveys conducted by Paul Joslin in Iran turned up no signs of the Caspian tiger and the conclusion was made that the Caspian tiger had been extirpated. International cat experts only became aware of the presence of the Caspian tiger in Turkey after a tiger was killed in Uludere, Şırnak 1970 (Uludere was a sub-province of Hakkari in 1970). Three years later, a botanist visiting the area saw and photographed the tiger pelt and published the story (Baytop, 1974)."

Turkish scientists, during a study on the field, reached some information on the presence of the Caspian tiger.

"Within the framework of Southeastern Anatolia Biodiversity Research Project of WWF-Turkey, a survey was conducted to reveal the large mammal presence and distribution in the region (Can & Lise, 2004). Within the framework of the first attempt to collect systematically the large mammal data in Southeastern Turkey. First, a questionnaire was designed and distributed to 450 military posts in the region. The questionnaire included questions about the presence of large mammal species and each questionnaire was accompanied with Turkey's Mammal Poster of Turkish Society for the Conservation of Nature (which became WWF-Turkey later). The questionnaires were filled out by military personnel in cooperation with the local people and 428 questionnaires were returned to WWF-Turkey. The questionnaires also included questions related with the historical tiger presence in the region. Later, the questionnaire results were used to identify the areas on which the field survey will focus.

The questionnaire revealed that some military personnel had heard rumors about the presence of large cats in the region. During the interviews with local people, the mammal team collected rumors about big cat sightings and met local people that claimed to hear roaring from different sites. In addition, it was reported that there was a local tiger pelt trade in the region and three to five tigers were killed in each year and the pelts were sold to rich land lords in Iraq until the mid-1980s. This confirms Turan's findings (1984,) who obtained his information from local hunters in the region. Baytop (1974) similarly reported that 1-8 tigers were killed each year in the Şırnak region.

Considering that one to eight tigers were killed each year in Eastern Turkey until the mid 1980s, the tiger that was killed in Uludere was a young individual according to the stripe patterns. The Caspian tiger is likely to have existed in the region at least until the early 1990s. Nevertheless, due to lack of interest in addition to security and safety reasons, trained biologists had not attempted to survey in Eastern Turkey before."

While these anecdotal sightings do not prove that the Caspian tiger survived, researchers believe they should investigate this possibility seriously. An investigation was planned for sometime in 2006.. No such investigation has yet been made.

Reported sightings

There are still occasional claims of the Caspian tiger being sighted, with some occurring in Afghanistan, pug marks [tiger paw prints] have occasionally been reported, and others coming from the more remote forested areas of Turkmenistan. However, experts have been unable to find any solid evidence to substantiate these claims and the last reliable sighting was probably at least 30 years ago. It has also been suggested that the 'tiger' sightings may actually be Persian Leopards. Any hope of Caspian tigers in Afghanistan could be further dashed as war continues to rage across areas of the country.

Without photographic evidence, expert assessment of pug marks, attacks on animals or people, or a sighting by an expert authority, there is presently no good reason to believe that the Caspian Tiger still lives. Nonetheless, complete resolution of the matter will probably not be achieved until some time in the late first decade of the 21st century, given the need to investigate the Turkish reports.

Russia-Iran re-population project

Iranian and Russian ecologists are planning a joint project intended to return Caspian Tigers and Asiatic Cheetahs to the wild in the Central Asian region, as the latest genetic studies have shown that the amur tiger is related and virtually identical to the now extinct Caspian Tigers; hence the Russians want to offer it to Iran to repopulate its former range in northern Iran in exchange for critically endangered Asiatic Cheetahs that Russia wants to acquire from Iran to repopulate the northern Caucasus region of central Asia. However, although there are many more Amur Tigers in the wild than the tiny numbers of surviving Asiatic cheetahs, and while there is a healthy population of amur tiger in the captive breeding program in the zoos there is no captive breeding population of the Asiatic Cheetah in any zoo. While discussing the prospects of reintroducing the cheetah in India the cheetah experts from the world over have already warned that no individuals from the critically low Asiatic cheetah population in Iran should be withdrawn at this stage for any reintroduction experiment elsewhere, like the one proposed by Russia in exchange for the more abundant Russian Tiger, as the limited gene pool of Asiatic cheetah in Iran will suffer a tremendous blow.

In 2010, Russia exchanged 2 captive Amur tigers for Persian Leopards with the Iran Government, as conservation groups of both countries have agreed on restocking these animals back into the wild within the next 5 years. Some experts, however, doubt the plan as they feel that this is a political publicity exercise. Unfortunately the male Siberian tiger died in Tehran Zoo on 3rd of January 2011.

Javan Tiger

Javan Tiger



Javan tiger photographed by Andries Hoogerwerf in Ujung Kulon National Park, 1938

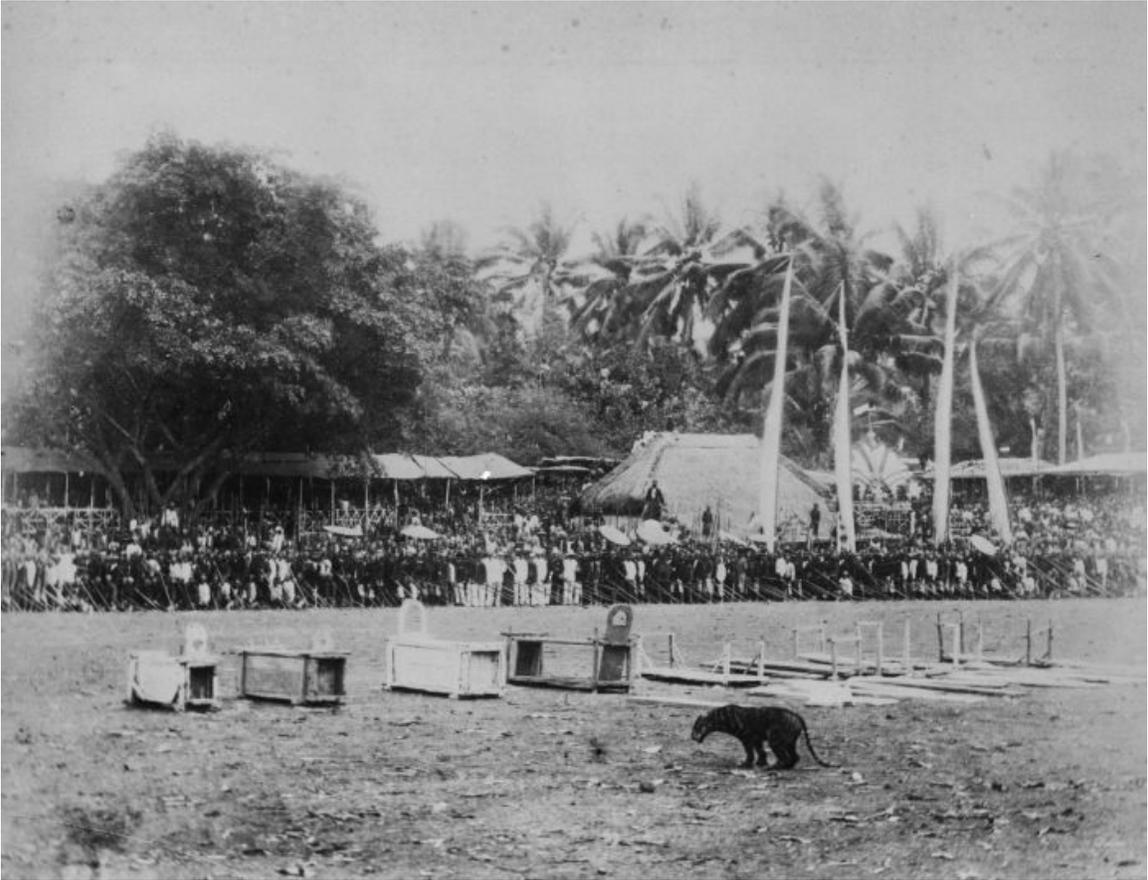
The **Javan tiger** (*Panthera tigris sondaica*) is an extinct tiger subspecies. It inhabited the Indonesian island of Java until the 1980s and was one of the three subspecies limited to islands.

Description

Javan tigers were very small compared to other subspecies of the Asian mainland, but larger in size than Bali tigers. Males weighed between 100 and 140 kg (220 and 310 lb) on average with a body length of 200 to 245 cm (6.6 to 8.04 ft). Females were smaller than males and weighed between 75 and 115 kg (170 and 250 lb) on average.

Their nose was long and narrow, occipital plane remarkably narrow and carnassials

relatively long. They usually had long and thin stripes, which were slightly more numerous than of the Sumatran Tiger.



Tiger fight in Java, 1870-1892



A group of men and children poses with a recent killed tiger in Malingping in Banten, West-Java, 1941

At the beginning of the 20th century 28 million people lived on the island of Java. The annual production of rice was insufficient to adequately supply the growing human population, so that within 15 years 150% more land was cleared for cultivating rice. In 1938 natural forest covered 23% of the island. 1975 only 8% forest stand remained; the human population had increased to 85 million people. In this human-dominated landscape the extirpation of the Javan Tiger was a process intensified by the conjunction of several circumstances and events:

- Tigers and their prey were poisoned in many places during the period when their habitat was rapidly being reduced;
- Natural forests were increasingly fragmented after World War II for plantations of teak, coffee and rubber, which was unsuitable habitat for wildlife;
- Rusa deer, the tiger's most important prey species, was lost to disease in several reserves and forests during the 1960s;
- During the period of civil unrest after 1965 armed groups retreated to reserves, where they killed the remaining tigers.

Last efforts

Until the mid-1960s tigers survived in three protected areas, which had been established during the 1920-1930s: Ujung Kulon, Leuwen Sancang and Baluran. But following the period of civil unrest no tigers were sighted there any more. In 1971 an older female was shot in a plantation near Mount Betiri in the southeast of Java. Since then not a single cub has been recorded in this last known refuge of the big cats. The area was upgraded to a wildlife reserve in 1972, at which time a small guard force was established and four habitat management projects initiated. The reserve was severely disrupted by two large plantations in the major river valleys, occupying the most suitable habitat for the tiger and its prey. In 1976, tracks were found in the eastern part of the reserve, suggesting the presence of 3-5 tigers. Only a few banteng survived close to the plantations, but tracks of rusa deer, the preferred prey of the Javan tiger, were not sighted.

After 1979, there were no more confirmed sightings of tigers in Meru Betiri. In 1980, Seidensticker and Suyono recommended extending the wildlife reserve and completely eliminating the disruptive influence of humans on the fragile ecosystem. The Indonesian Nature Conservation Authority implemented these recommendations in 1982 by gazetting the reserve as a national park. These measures were however too late to save the few remaining tigers in the region.

In 1987, a group of 30 students of the *Indonesian Agricultural University of Bogor* (Institut Pertanian Bogor) conducted an expedition to Meru Betiri National Park. In groups of five they searched the complete area and found tiger scat and tracks.

In the West of Java lies the Halimun Reserve, today integrated into the Mount Halimun Salak National Park. In 1984, a tiger was killed there; and in 1989, pugmarks were found that were the size of a tiger's. However, an expedition of six biologists conducted in 1990 did not yield any definite, direct evidence for the existence of tigers.

A subsequent survey was planned in the Meru Betiri National Park in autumn 1992 with the support of WWF Indonesia, deploying camera traps for the first time. From March 1993 to March 1994 cameras were positioned at 19 sites, which did not yield a single picture of a tiger. During this period, no tracks indicating the presence of tigers were discovered. After the final report of this survey had been published, the Javan tiger was declared extinct.

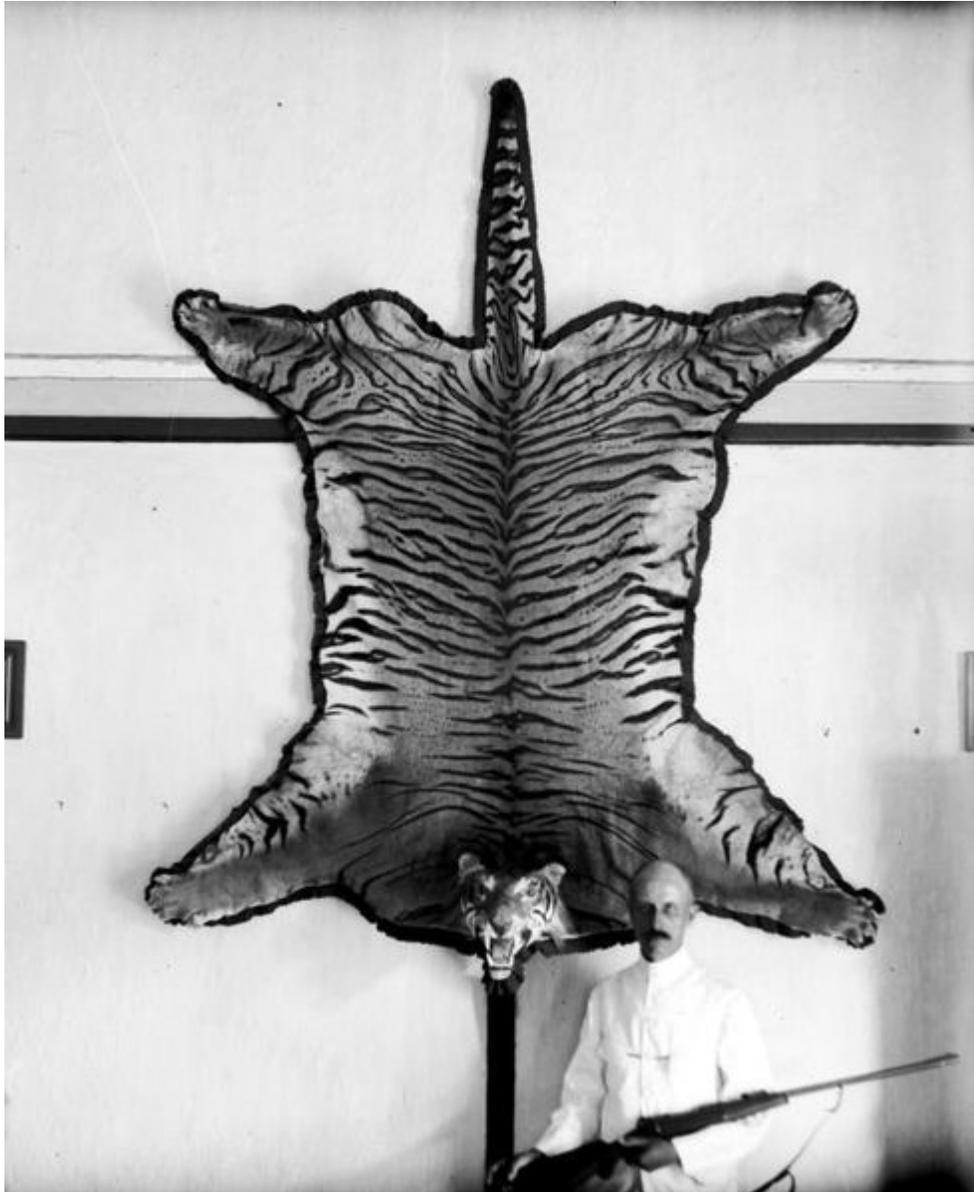
Rumours and indications of the possible presence of tigers in the Meru Betiri National Park prompted the park's Chief Warden *Bapak Indra Arinal* to initiate another search. With support of the *Sumatran Tiger Project*, twelve members of the park staff were trained in autumn 1999 to set up camera traps and map their observations. The Canadian *The Tiger Foundation* provided infrared cameras. Despite a year of work, they photographed no tigers, few prey, and lots of poachers.



Banteng: bulls of the Javan subspecies *Bos javanicus javanicus* are black



Rusa deer from the islands offshore Ujung Kulon have been resettled in Meru Betiri.



Skin of Java tiger, 1915

Occasional reports still surface of enthusiasts who believe that the tiger still exists in Java.

Despite the continuing claims of sightings it is far more likely that, even with full protection and in reserve areas, the Javan tiger has been extirpated. The 'tigers' are quite likely to be leopards seen from a distance.

In November 2008, an unidentified body of a female mountain hiker was found in Mount Merbabu National Park, Central Java, allegedly died from tiger attack. Villagers who discovered the body have also claimed some tiger sightings in the vicinity.

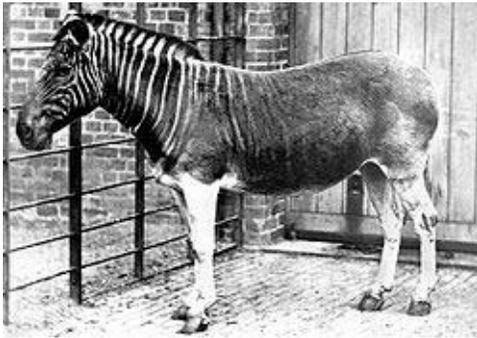
Another recent sighting occurred in Magetan Regency, East Java, in January 2009. Some villagers claimed to see a tigress with two cubs wandering near a village adjacent to Lawu Mountain. This news immediately triggered mass panic. A subsequent investigation by local authorities found several fresh tracks in the location. However, by that time, those animals were already gone.

Following the October 2010 eruption of Mount Merapi, two Indonesian villagers have claimed sightings of a big cat paw print in the residual ash, which sparked rumours a tiger or leopard was roaming abandoned farms in search for food. Personnel of the near-by national park did not think it likely that this paw print was a tiger's.

Chapter- 8

Extinct Perissodactyls

Quagga

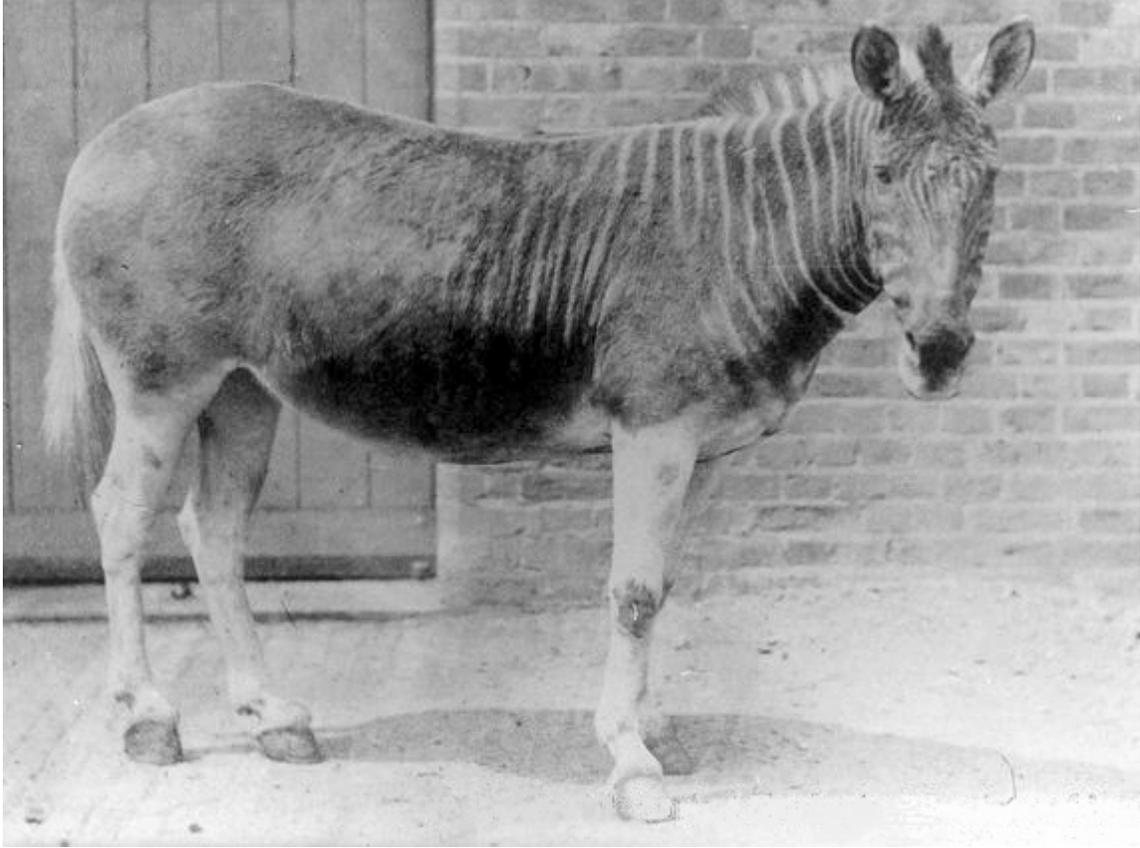


The **quagga** (*Equus quagga quagga*) is an extinct subspecies of the plains zebra, which was once found in great numbers in South Africa's Cape Province and the southern part of the Orange Free State. It was distinguished from other zebras by having the usual vivid marks on the front part of the body only. In the mid-section, the stripes faded and the dark, inter-stripe spaces became wider, and the rear parts were a plain brown. The name comes from a Khoikhoi word for *zebra* and is onomatopoeic, being said to resemble the quagga's call. The only quagga to have been photographed alive was a mare at the Zoological Society of London's Zoo in Regent's Park in 1870.

Range and habitat

The quagga lived in the drier parts of South Africa, on grassland. The northern limit seems to have been the Orange River in the west and the Vaal River in the east; the southeastern border may have been the Great Kei River. It was hunted for its meat and hide, and is one of the many victims of modern mass extinction.

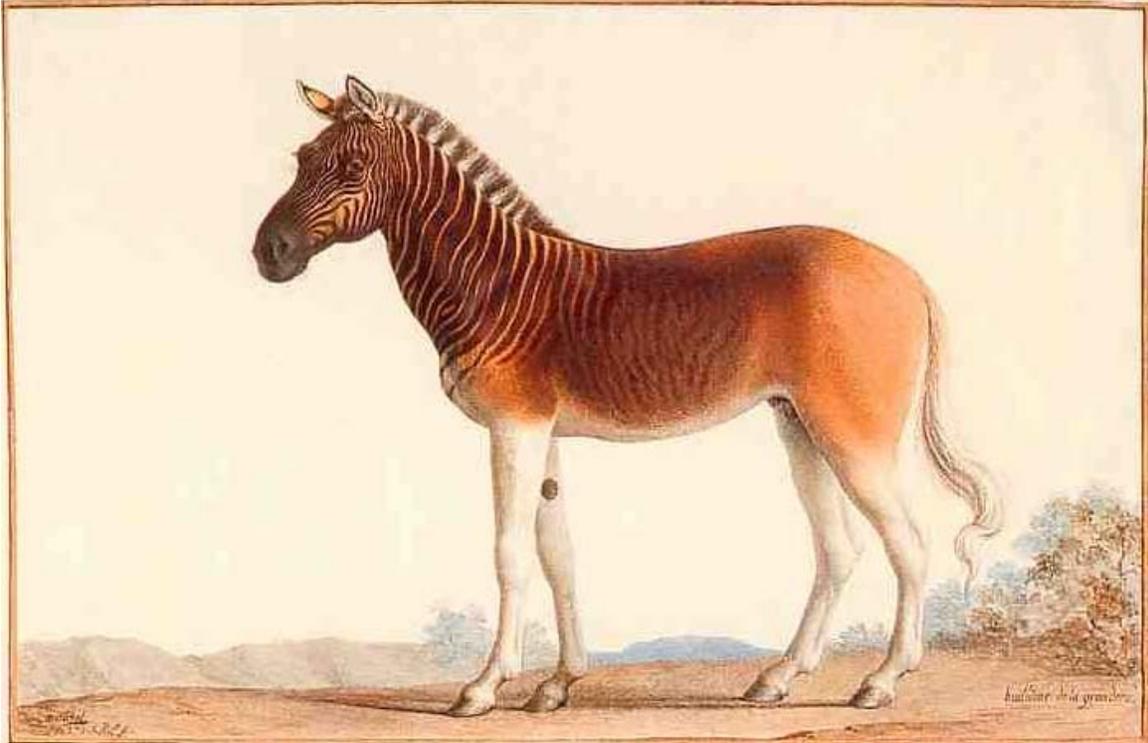
Taxonomy



Quagga in enclosure

The quagga was originally classified as an individual species, *Equus quagga*, in 1778. Over the next 50 years or so, many other zebras were described by naturalists and explorers. Because of the great variation in coat patterns (no two zebras are alike), taxonomists were left with a great number of described "species", and no easy way to tell which of these were true species, which were subspecies, and which were simply natural variants.

Long before this confusion was sorted out, the quagga had been hunted to extinction for meat, hides, and to preserve feed for domesticated stock. The last wild quagga was probably shot in the late 1870s, and the last specimen in captivity, a mare, died on August 12, 1883 at the Natura Artis Magistra zoo in Amsterdam. Because of the confusion between different zebra species, particularly among the general public, the quagga had become extinct before it was realized that it may have been a separate species.



1793 illustration of the quagga stallion of Louis XVI's menagerie at Versailles.

The quagga was the first extinct creature to have its DNA studied. Recent genetic research at the Smithsonian Institution has demonstrated that the quagga was, in fact, not a separate species at all, but diverged from the extremely variable plains zebra, *Equus burchelli*, between 120,000 and 290,000 years ago, and suggests that it should be named *Equus burchelli quagga*. However, according to the rules of biological nomenclature, where there are two or more alternative names for a single species, the name first used takes priority. As the quagga was described about thirty years earlier than the plains zebra, it appears that the correct terms are *E. quagga quagga* for the quagga and *E. quagga burchelli* for the plains zebra, unless "*Equus burchelli*" is officially declared to be a *nomen conservandum*.



Quagga specimen at Natural History Museum, London.

After the very close relationship between the quagga and surviving zebras was discovered, the Quagga Project was started by Reinhold Rau (1932–2006) in South Africa to recreate the quagga by selective breeding from plains zebra stock, with the eventual aim of reintroducing them to the wild. This type of selective breeding is also called *breeding back*. A foal of the Quagga Project, named Henry, was born on 20 January 2005. In early 2006 the third and fourth generation animals produced by the project were reported to look very much like the depictions and preserved specimens of the quagga. The practice of breeding back generally and specifically whether looks alone are enough to declare that this project has truly recreated the original quagga are both controversial.

DNA from mounted specimens was successfully extracted in 1984, but the technology to use recovered DNA for breeding does not yet exist. In addition to skins such as the one held by the Natural History Museum in London, there are 23 known stuffed and mounted quagga throughout the world. A twenty-fourth specimen was destroyed in Königsberg, Germany (now Kaliningrad), during World War II.

Quagga hybrids and similar animals

Zebras have been crossbred to other equines such as donkeys and horses. There are modern animal farms which continue to do so. The offspring with donkeys are known as *zeedonks* or *zonkeys* and offspring of horses are called *zorses*; the term for any zebra hybrid is *zebroid*. Zebroids are often exhibited as curiosities, although some are broken to harness or as riding animals.

There is a record of a quagga bred to a horse in the 1896 work *Anomalies and Curiosities of Medicine* by George M. Gould and Walter L. Pyle:

“ In the year 1815 Lord Morton put a male quagga to a young chestnut mare of seven-eighths Arabian blood, which had never before been bred from. The result was a female hybrid which resembled both parents. ”

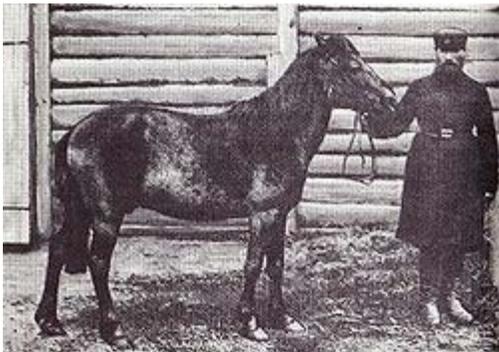
In his 1859 *The Origin of Species*, Charles Darwin recalls seeing coloured drawings of zebra-donkey hybrids, and mentions "Lord Moreton's famous hybrid from a chesnut [sic] mare and male quagga..." Darwin mentioned this particular hybrid again in 1868 in *The Variation of Animals and Plants under Domestication*, and provides a citation to the journal in which Lord Morton first described the breeding.

In popular culture

A quagga appears in a sequence in the Soviet Union's animated film *The Cat Who Walked by Herself*, in which a dog tracks the hoofprints of one, and a cat tells a boy of the *Red Book* of endangered species, and how Quagga had "her track severed" (that is, made extinct) due to Man's selfish actions. One is also mentioned in the film *Jurassic Park*, and the animal can be unlocked in the computer game *Zoo Tycoon 2: Extinct Animals*.

Quaggas have appeared in several books including *Artemis Fowl: The Time Paradox* by Eoin Colfer, *Skybreaker* by Kenneth Oppel, *King Solomon's Mines* by H. Rider Haggard and the short story "King of the Beasts" by Philip José Farmer. A quagga is one of the main characters in *The Katurran Odyssey*, a fantasy children's book by David Michael Wiegler.

Tarpan



Tarpan (*Equus ferus ferus*, also known as **Eurasian wild horse**) is an extinct subspecies of *wild horse*. The last individual of this subspecies died in captivity in Russia in 1909.

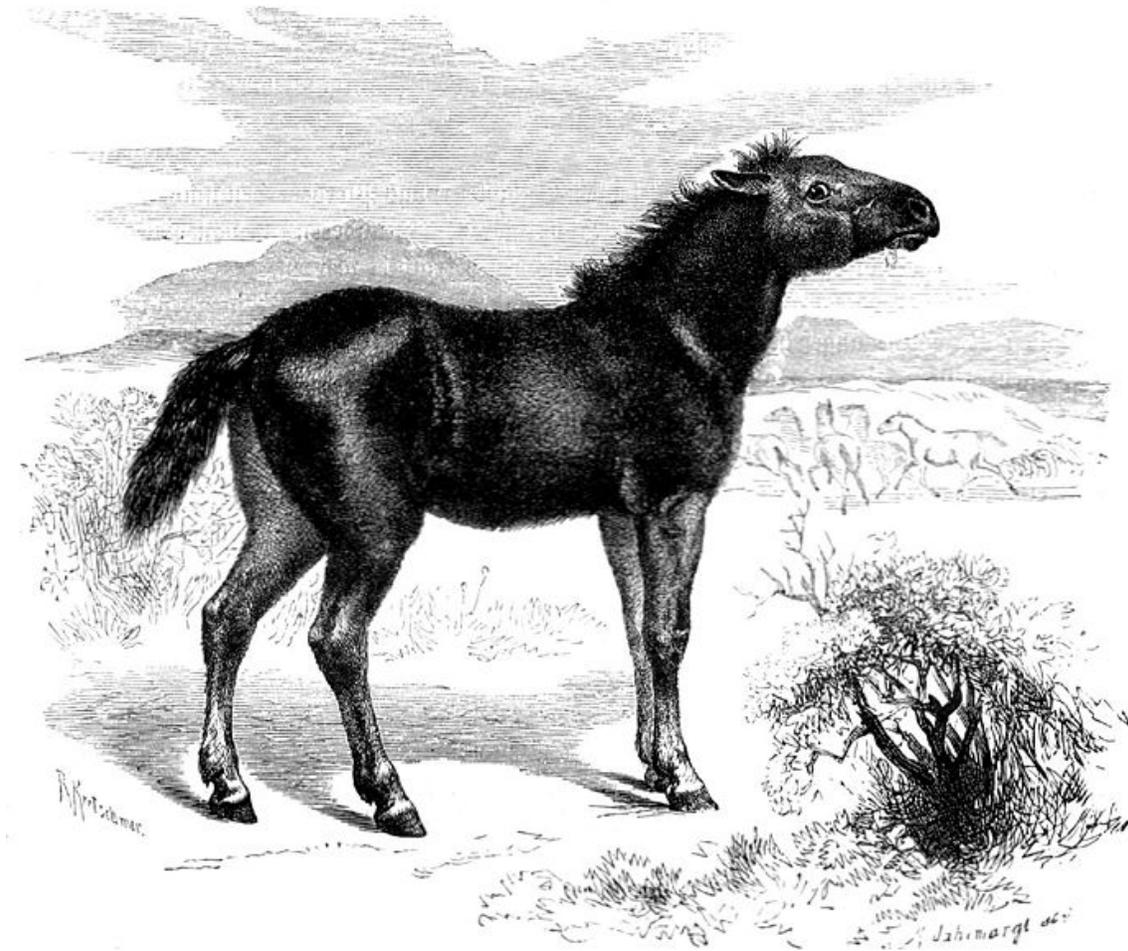
Beginning in the 1930s, several attempts have been made to re-create the tarpan through selective breeding. The breeds that resulted included the Heck horse, the Hegardt or

Stroebel's horse, and a derivation of the Konik breed - all of which resembled the original tarpan, particularly in having the grullo coat color of the tarpan.

Name and etymology

The name "tarpan" or "tarpani" is from a Turkic language (Kyrgyz or Kazakh) name meaning "wild horse". The Tatars and Cossacks distinguished the wild horse from the feral horse; the latter was called *Takja* or *Muzin*.

Taxonomy



1883 drawing

The tarpan was first described by Johann Friedrich Gmelin in 1774; he had seen the animals in 1769 in the region of Bobrovsk, near Voronezh. In 1784 Pieter Boddaert named the species *Equus ferus*, referring to Gmelin's description. Unaware of Boddaert's name, Otto Antonius published the name *Equus gmelini* in 1912, again referring to Gmelin's description. Since Antonius' name refers to the same description as Boddaert's it

is a junior objective synonym. It is now thought that the domesticated horse, named *Equus caballus* by Linnaeus in 1758, is descended from the tarpan; indeed, many taxonomists consider them to belong to the same species. By a strict application of the rules of the International Code of Zoological Nomenclature, the Tarpan ought to be named *E. caballus*, or if considered a subspecies, *E. caballus ferus*. However, biologists have generally ignored the letter of the rule and used *E. ferus* for the Tarpan to avoid confusion with its domesticated cousins.

In 2003, the International Commission on Zoological Nomenclature "conserved the usage of 17 specific names based on wild species, which are pre-dated by or contemporary with those based on domestic forms", confirming *E. ferus* for the Tarpan. Taxonomists who consider the domestic horse a subspecies of the wild Tarpan should use *Equus ferus caballus*; the name *Equus caballus* remains available for the domestic horse where it is considered to be a separate species.

History

The Tarpan is a prehistoric wild horse type that ranged from Southern France and Spain east to central Russia. There are cave drawings of what are believed to be Tarpans in France and Spain, as well as artifacts believed to show the species in southern Russia, where Scythian nomads domesticated a horse of this type around 3000 BC.

The Tarpan horse died out in the wild between 1875 and 1890, when the last known wild mare was accidentally killed during an attempt at capture. The last captive Tarpan died in 1909 in a Russian zoo. An attempt was made by the Polish government to save the Tarpan type by establishing a preserve for animals descended from the Tarpan in a forested area in Bialowieza. These descendants are today sometimes referred to as the Polish primitive horse.

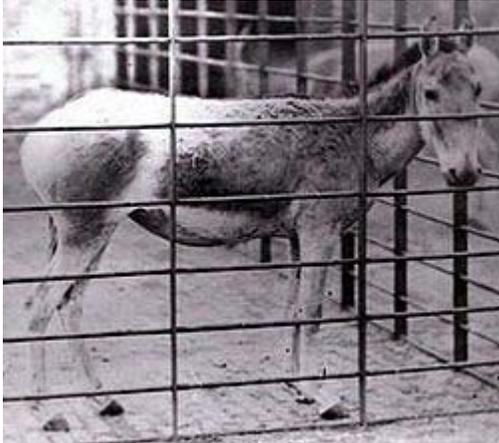
Recreation of type



Heck horse in Haselünne, Germany (2004)

Three attempts have been made to re-create the Tarpan. In the early 1930s, Berlin Zoo Director Lutz Heck and Heinz Heck of the Munich Zoo began a program that by the 1960s produced the Heck horse. In 1936, Polish university professor Tadeusz Vetulani began a program using Konik horses, and in the mid-1960s Harry Hegard started a program in the United States using feral mustangs and local working ranch horses that has resulted in the Hegardt or Stroebel's Horse. None of the breeding programs were completely successful, although all three resulted in horses with many similarities to the Tarpan.

Syrian Wild Ass



The **Syrian Wild Ass** (*Equus hemionus hemippus*) is an extinct subspecies of *Equus hemionus* that ranged across Syria, Jordan and Iraq.

The Syrian Wild Ass was the smallest form of Equidae and could not be domesticated. Its coloring changed with the seasons – a tawny olive coat for the summer months and pale sandy yellow for the winter.

It is believed this is the animal described as the “wild ass” in several books of the Old Testament, including Job, Psalms, Sirach and Jeremiah. European travelers in the Middle East during the 15th and 16th centuries reported seeing large herds. However, its numbers began to drop precipitously during the 18th and 19th century due to overhunting, and its existence was further imperiled by the regional upheaval of World War I. The last known wild specimen was fatally shot in 1927 at the Al Ghams oasis near Lake Azraq in Jordan, and the last captive specimen died the same year at the Vienna Zoo.