Study of horse in time and space

Dr. Ven. Uduwila Uparathana

Introduction

This work seeks to identify the technology, strategies, and ideologies that enabled equestrians of various eras and geographical areas to successfully traverse vast tracts of arid and semiarid lands and, by doing so, to disseminate significant new concepts and developments across continents. This work approaches movement from the boundary and always keeps in mind the dual types of horsepower, its destructive and constructive qualities. To record early nomadic travel over the Eurasian steppes and subsequent horse-drawn military incursions into major towns, civilization on a larger scale is acknowledged. The horse was first domesticated by Indo-European farmers of the Pontic-Caspian region in the fourth millennium BC, who were also skilled in metalworking and herding. The resulting horse culture hastened early westward expansion into Europe. To record early nomadic travel over the Eurasian steppes and subsequent horse-drawn military incursions into major towns, civilization on a larger scale is acknowledged. The horse was first domesticated by Indo-European farmers of the Pontic-Caspian region in the fourth millennium BC, who were also skilled in metalworking and herding. The resulting horse culture has accelerated early westward expansion into Europe and swift eastward expansion into the interior of the Eurasian steppe with successful adaption to that hostile environment. Wheeled steppe transport vehicles, mobile homes, weapons, early irrigation, and bronze, gold, and iron metallurgy are examples of adaptation techniques. The art and ceremony of the enormous burial tumuli that are dispersed throughout the

steppes offer another window into the nomad mentality. 2,000 years of prosperous agropastoralism saw the high mobility was made possible, allowing for the armed invasion of sedentary civilization's urban centers, the expansion of the steppe habit, and the founding of governments by horse charioteers in those prehistoric nuclear regions. Iron weapons and war chariots confined the battlefield in the Near East, Africa, Iran, India, and China, as depicted in the Rigveda, an ancient text. The Hittites were the first to use dynamism in the forceful relocation of conquered populations to boundary zones of their Anatolian kingdom in the second millennium BC. They also used strict training methods for the chariot horse. All sites of civilization in Eurasia and North Africa had been introduced to the war chariot and later the cavalry by the end of the first millennium BC, whether outright either a planned acquisition or conquest. First, the significant ceremonial role of the ancient megalithic buildings of prehistoric Europe is depicted as solar centers of horse ritual. The early intercontinental conflict during the Trojan War, later Greco-Macedonian resistance to Asia's Persian might, Hannibal's Punic invasion of Spain and Italy, and Rome's "near defeat and subsequent adoption of Carthaginian cavalry tactics to colonize most of Europe and the Mediterranean littoral are then discussed in relation to Europe's equestrian militarism 2000 BCE to 1000 AD although troops from the periphery steppes and deserts had only partially conquered Eurasia, this pattern of invasion was about to intensify. An equine military force that would shake both continents blew up in furthermost Mongolia at the beginning of the second millennium AD. The Mongol conquest spread from the Pacific to the Baltic and persisted for several centuries in the form of different khanates thanks to the use of Chinese siege technology, which no other nomads had used previously. Western European nations frantically looked to the oceans to escape the Muslim stifling of Middle Eastern

trade channels in the face of this most recent invasion from the steppes.

The purpose of the study

This study's objective is to comprehend the history of using horses for a variety of purposes.

The goals

to get a reliable historical report.

to explain how horses are used on a domestic level.

to better understand how horses are used in combat and for dragging cargo.

to comprehend the equine osseous traces in Sri Lankan soil.

to determine the biological variations among Equus variants in a certain area, such as South Asia.

To make clear the Equus fossil evidence.

to comprehend how wild horses are used to create domesticated horses.

to determine how horse power has been used to advance civilizations over time and space.

research techniques

The main methods used were field trips and data collection. The books, articles, and other materials that have appeared in both national and international were processed.

The conversation

Let's try to recover a more ancient epic, that of the wild horse itself, which occurred long before the domestication of the horse, before we set out on man's high-speed adventure on horseback. About six or seven million years ago, Homo as a bipedal hominid first appeared. the species of equis In contrast, the evolution of swift forward mobility, which led to the contemporary horse and its closest relatives, asses and zebras, took place over a period of more than 55 million years. This process is evidenced by the abundance of robust fossil limbs that have been found on all continents. In its broadest meaning, the family Equidae, which includes current Equus and all fossil relatives descended from the original line as far back as the Eocene, is the family of horses. The Hyracotherium, or "dawn horse," was the first equine to diverge from the ancestor Perissodactyl during that remote period. A timid herbivore between 25 and 50 cm tall, it was developed to eat forest fruits, soft seeds, and moist leaves. In the ensuing 60 million years, This small animal would undergo evolutionary modifications to become the sturdy horse we know today. In Hyracotherium, the body weight was supported by cushioned fingers or toes while the heels of all four feet were elevated off the ground. This additional distance from knee to ground substantially aided running, together with the minor lengthening of the toe and shin bones (Simpson 1951:116–119). The astragalus bone at the ankle joint, which has two raised parallel ridges at the place of articulation with the tibia, was another Perissodactyl invention. This sort of joint, which appears to be an early adaptation to high-speed travel over distance, allows for easy fore-and-aft flexion but reduces wasteful lateral movement and the potential of dislocation (Hulbert). . Hyracotheria had surrounded the earth by 58 million years ago, but it went extinct in Eurasia during the Oligocene. Before the modern Equus eventually emerged in

North America, this sequence of worldwide radiation and Old-World extinction would continually occur.

In North America, equids persisted and took a unique evolutionary path. The Oligocene saw a number of alterations in Mesohippus and Miohippus, both of which stood around six hands or sixty centimeters tall. The hind leg's distinctive characteristic distinguishes Miohippus from Mesohippus. Previously in contact with a single ankle bone, the cannon bone, or the metatarsal of the middle toe, now articulates with the outer ankle bone to create a wider, stronger joint. These two equids had only three toes on each of their four feet. (tridactyl), with the middle toe being significantly bigger than the side toes (Simpson 1951:124,127); the retention of side toes likely offered better traction on muddy soils and lateral stabilization when turning quickly to avoid bushes and trees (MacFadden 1992:259). As many lines diverged from Miohippus, the late Oligocene was a crucial period for branching and radiation. But once more during the Miocene, many of these equids went extinct when aridity levels increased globally, causing forests to disappear and grasslands to proliferate—the same circumstances that caused many other browsing herbivores to die out at the time (MacFadden 1992:160–161; Hulbert 1996:23–).24). In these wide-open Miocene landscapes, grass—a new, abundant food source—became available. Parahippus was a mixed feeder, shifting between grazing and browsing. The highly resistant lignin and silica found in the cell walls of grasses, however, made them difficult to digest. Extensive chewing was necessary in the novel equine adaption of grazing in order to dissolve the hard phytoliths and release the nutrient-rich cell contents. Radical changes to the dentition were required to take advantage of this novel food supply (MacFadden 1992:229; Simpson 1951:131). In the succeeding genera of Parahippus and Merychippus, hypsodonty (long-toothedness) gradually evolved to cope with

the hard diet of grass combined with abrasive grit. Deep ridges and high-crowned cheek teeth evolved. With this rise in crown height, the beginning of theonly a little portion of the crown protruded from the gum; the rest was buried in the socket and saved for later use. The entire tooth continued to move outward with wear to retain an effective grinding surface over an extended period, greatly increasing the animal's lifespan. In the end, Merychippus had a fully developed cheek dentition that was superbly fitted for laterally grinding the lower jaw against the upper. The equid digestive tract, which, in contrast to the bovid divided stomach with rumen, had alongside the large intestine a developed cecum, housing symbiotic microorganisilfis that breakdown the cellulose of grass, was also crucial for long-distance transit across grasslands. In contemporary Equus, the cecum is 1.25 m long and has a volume of 30 L. Consequently, equids, as opposed toIn order to ruminate, cattle did not require a break after feeding (Clutton-Brock 1992:21–22; MacFadden 1992:237; Simpson 1951:132–135).

While the two rudimentary side toes persisted in both Parahippus and Merychippus, the third middle digit's convex hoof supported the entire body weight. Additionally, Merychippus' lower forefoot's ulna and radius had solidly bonded to form a more stiff structure as an adaption to fast running on hard ground. Strong ligaments that provided support and a spring-like motion to the foot went from the middle metapodial to the back of the elongated toe bones (Hulbert 1996:24). These adaptations were brought about by the genuine need for a more faster gait. This period is characterized by rising aridity and open land, according to geological data. the body Size, equid longevity, and home range all increased to no hands. Equids would have traveled far in quest of sporadic food supplies throughout the year's several seasons. The locomotory mechanism of equids would have evolved more endurance as a result of this increased

cursoriality. The equids were also more conspicuous and so more vulnerable to predators in an open habitat. Therefore, being quick was essential for both locating food and avoiding speedy mammalian predators (MacFadden 1992:26o). These significant modificationsoccurred when grasslands were abundant and provided a new ecological niche for the evolution of equids.

Numerous species of tridactyl grazers evolved these new adaptations into the Pliocene during the late Miocene, which was distinguished by a high level of generic diversity. Merychippus was replaced by the tridactyl Hipparion, the most developed equine ever in terms of teeth, which successfully moved over the Old World (Hulbert 1996:27). The following, nevertheless, most crucial invention happened in eastern North America. The two side toes were lost there in Pliohippus, forming vestigial splints under the skin of the upper part of the foot, leaving only one digit per foot—monodactyl. The horny skin growths known as "chestnuts" and "ergots," which are visible on the surface of the limbs, are remnants. the toes of these ancestors. The oldest members of the Equus lineage were later monodactyls that originated in Utah's dry intermontane basins toward the end of the Miocene. Global climates underwent a significant change at this time, entering cyclical glacial/interglacial ages. Numerous savanna species went extinct as the rich savannas were replaced by grasslands that were less diversified. Tridactyl, which was more adapted to early damp habitats, was extinct in North America by the late Pliocene, with only hipparionines remaining in some regions of the Old World until the mid-Pleistocene.3 Such widespread extinctions of tridactyls would have effects on human society in the future, as will be revealed in the chapters that follow. Monodactyls, which are ideally suited to drier climates, would proliferate widely throughout the planet's arid and temperate regions. but never develop a tolerance for the former tridactyl environment in tropical or

wet areas. Dinohippus, a monodactyl, predominated the North American continent for 7 million years before Equus eventually appeared 4.5 million years ago. Equus arrived in South America by the middle of the Pleistocene, where it coexisted with earlier arrivals, the monodactyls Hippidion and Onohippidiurn. Equus also inhabited the Old World through a complex branching and radiating mechanism. The ancestors of current zebras were highly differentiated during the sub-Saharan Pleistocene. The asses dispersed to the Old World 900,000 years ago, and the horse somewhat later became very successful. The other groups of Equus, the asses and the horse (ancestor of current wild and tame horses), likely originated in North America 1.5 million years ago. (Hulbert 1996:28-32) All over Eurasia.

Ironically, despite having inhabited the majority of the planet and surviving the last Ice Age, Equus went extinct in South and North America 9,000 years ago, the latter being the region where it spent its first 60 million years of evolution. What caused this extinction is unknown. large herds while camelids and mastodons were still alive and well during the Pleistocene era and the prairies were mostly spared by glaciers, both species became extinct in North America. However, bison that eat the same pasture as Equus continued unabated. Disease is improbable because it would likely have affected a wide range of animals, including bison. It's possible that human encroachment, overhunting in the past, and Amerindian immigration all played a role (Simpson 1951:148–150).

Equus eventually stood between 12 and 13 hands at the Ice Age's end.4 Equus had a long neck and especially long head that permitted it to feed on the lower grass while its eyes stayed high and attentive. Equus was always alert to predator approach and poised for instant flight. In the protruding muzzle The first premolar (also known as the wolf tooth) had vanished, and

mares' canines were frequently gone as well. This caused the gap between the front and cheek teeth to widen even more, which was crucial for the placement of the bit (the mouthpiece of the bridle) in domestication (Clutton-Brock 1992:21; Duncan, Ryder, Asa, and Feh 1992:3–4). Equus had lengthened the leg more effectively where it mattered most for locomotion—the lower end. The species moved solely on one hoof, its long metacarpals and metatarsals lifted high above the ground. Slim but incredibly strong, one leg could support the entire animal's weight during a long gallop. Highly intricate digital ligaments in the toe served as a spring mechanism. when running, when stepping impact on one foot caused the middle toe to flex forcefully, stretching the elastic ligaments and releasing potential energy. In equids of increasing weight, this spring enabled amazingly quick and effective motion (Simpson 1951:198-201). This leaping motion caused morphological modifications, including enhanced restriction of lateral limb motion, reorientation of the upper limb bones and musculature for a more powerful stride, and increased density of the trabeculae, which improved the strength of the limb bones. Little more weight could be supported by its speed mechanisms. Equus had developed to be as quick as was mechanically possible for an animal of its size, with its strong limbs supporting a body mass that was frequently over 500 kg in contemporary times and putting a tremendous amount of compressive stress on the skeleton while running. The current racehorse can run at a top speed for all mammals of 65 km/h and complete more than two steps per second. The cheetah is faster than the horse over short distances, while Equus is unmatched over long distances in terms of speed, strength, and endurance (MacFadden 1992:246-247, 259).

Currently Existing Wild Equus

Thus, wild equines spread to all continents barring Australia and Antarctica. The Equus was a successful eater of

coarse fodder, or the edible sections of bushes and trees, if the favored diet of grasses was too scant, such as in deserts or the winter. Zebras, Asian asses, African asses, and horses are the four subgenera of the modern genus Equus that exist in the wild today. All wild equine species have short, erect manes and a dark dorsal stripe along the length of their bodies. The gestation time of modern wild horses is around a year, which is 20% longer than that of ruminants of equivalent size. As a result, equid foals are born at an advanced stage of development and have the ability to keep up with the moving band (Duncan et al. 1992:5).

Only three species of striped equids—the Grevy's zebra (Equus grevyi), the Mountain zebra (Equus zebra), and the Plains zebra (Equus burchelli)—are found in Africa. The majority of today's wild equids, with a population of over 500,000, are plains zebras, which historically roamed the grasslands and savannahs of Africa south of the Ethiopian Massif and the Zaire rain forest (Duncan and Gakahu 1992:12–13). Mountain zebras, on the other hand, can go up to 20 km from a water source in the winter and are exclusively found from southern Angola to Cape Province along the margins of deserts through semiarid to savannah grasslands (Novellie, Lloyd, and Joubert 1992:7-8). Grevy's zebras are undoubtedly the biggest and most adolescent-looking of all the zebra species. Adult male wild equids can weigh up to 450 kg, while adult females weigh only 1% less. They live in northern Kenya's semiarid scrub and grassland as well as nearby Ethiopia and Somalia (Rowen and Ginsberg 1992:10).

From the Black Sea eastward to the "Gobi" desert and south as far as Arabia, Persia, and northwest India, the Asian wild asses once roamed the desert regions. However, during the twentieth century, their numbers decreased to a mere tenth of this range (Clark and Duncan 1992:17). The kiangs (Equus

kiang), which make up the largest species, are well adapted to the high altitudes of the Tibetan and Ladakh plateaus, rising as high as 4,100-4,800 m. They eat on tough grasses in level places and have rough lips and a horny palate. and marsh vegetation, which would destroy other equids' mouths. Kiangs gain a thick layer of insulating fat in preparation for the next winter in August and September, when fodder availability is at its highest. Equus hemionus, another species of Asian ass, is smaller in stature and has a smaller skull than the kiang but has longer, more slender limbs and a lighter coat. The kulan of Central Asia and the onager of the Middle East are possibly the most well-known local names for the hemione (Woodward 1996:198-199). a different variety of wild ass, Equus hydruntinus, whose lineage is unknown, lived into the Holocene in southern Europe and was consumed during the Neolithic in Spain and eastern Europe before going extinct shortly after.

The most endangered of all living equids is the African wild ass (Equus africanus), which was once found from the Moroccan Atlas Mountains across North Africa to Nubia, Sudan, and Somalia (perhaps even into the Arabian peninsula). It is a graceful, fine-limbed animal that readily trots across rocks and gallops across the desert at a fast rate of speed. 3,000 of these species may still exist today in the distant, desert grasslands and bushlands of Ethiopia and Somalia, where the summertime high temperature reaches 50°C. They live in rough, rocky terrain, more so than their Asian equivalent, and eat forbs as well as grass and browse is also. It is reported that ranchers once tethered domestic donkey mares in heat out on the range near a watering well in the Hoggar highlands of Algeria so they could be ridden by a wild stallion of the Atlantic ass subspecies. Genetic swamping was the outcome of this and the fact that domestic asses frequently strayed away to join the wild population. Wild and cloned asses' genomes underwent considerable mixing. The

disappearance of the wild African ass from the northern regions of its habitat is likely primarily due to this introgression process.

Equus currently has two distinct social structures that are related to two distinct mate choice patterns. In equids living in incredibly dry settings, specifically the Grevy's zebra, African wild asses, and Asian wild asses, the dominant male frequently defends a sizable territory for an extended period of time and has the right to mate with any estrus female who wanders onto his territory. Adults do not form strong relationships. Thus, Grevy's zebras, African and Asian asses, and these aggregations of more than 100 individuals form loose groups where the main long-term bond is between the mother and her young, frequently up to the age of two. Without access to females, young males roam in bachelor groups until the point where they can defend their own territory (Duncan et al. 1992:4).

The Plains zebra exhibits a second sort of behavior that appears to be unique among ungulates, the mountain the wild horse (Equus ferns przewalskii) and the zebra. 5 In contrast, nonterritorial species establish smaller, long-term family groupings of one stallion, a harem of one to six mares, and their young (sometimes numbering as many as 17 animals). Both male and female offspring leave the natal group in order to lessen direct inbreeding. Fillies join another reproductive unit when they turn two years old, though they frequently go through an experimental stage. before settling into the permanent unit, he or she moved between other groupings. Once incorporated, they hardly ever alter, and mares exhibit a straight hierarchy of dominance based on age. After age three, when they may annoy mares in estrus and are evicted by the father, males in the natal group mature later. These lower-ranking stallions train for a few years with other bachelors to develop the combat prowess required to collect a harem. These stallions may form short-

term alliances with other stallions of equivalent rank in order to work together to defend a harem from intruders. However, at the age of four or five, a dominant stallion appears to drive out other males and claim the harem as his own; only extremely aggressive people are able to achieve this. The single bachelors could be joined by males who are ill or older and have been expelled by a younger rival from their family band. The highest ranking mare in the family band takes the lead during migration, and the other mares follow in escalating order of dominance, each with their offspring in ascending order of age. The powerful stallion keeps guarding the family from danger! Clutton-Brock (1992:22; Duncan et al. 1992:5) describes the band traveling forward from the rear.

The knowledge we have of the wild horse in the ancient world is very patchy and comes from a variety of sources. Instead of attempting to trace its prehistory and history to the time of human domestication, which will be covered in the following chapter, we will instead seek to do so until its terrible annihilation in the current times are wild horses were first used by humans in the Middle Paleolithic (100,000–35,000 BP). It is common knowledge that ancient hunters once lived in large caves and rock shelters in northern Spain, western France, and Italy. Over 2,000 animal images have been found hidden away in these low-ceilinged chambers, 610 of which were horse-related rock paintings, engravings, or moveable effigies (Bouman and Bouman 1994:5). Similar to this, enormous cliff drawings and cave frescoes from the Upper Paleolithic depicting wild horses alongside antelopes and woolly mammoths have also been discovered far across Asia in the Mankhan-Somon region of western Mongolia and the valley of the Upper Lena of Siberia. These wonderful works of rupestrian art unmistakably praised predatory animals as an essential source of inspiration. In addition to using them as emblems of food, they were also used

in rituals involving the hunt and the worship of deities as symbols of fertility (MacFadden 1992:1-3; Okladnikov 1990:56-57).

Archaeologists have discovered cut marks on bones, which indicate that horses were extensively killed back then for their skin and meat. Our best understanding of primitive hunting techniques were discovered at the French archaeological site of Solute, where upper Paleolithic horse hunts were regularly undertaken. Wild horses used that area as a seasonal migration route, moving from their Saone River winter floodplain home up into the summer pastures of the western foothills over a natural corridor between two limestone ridges. Using convergent lines of stone or brush, controlled brush fires, and torches, startled horses were forced into a cul-de-sac that served as a natural corral in this valley. Whatever the prehistoric methods, the death site at solutre measured about 1 ha, went down more than 9 m, and included between 32,000 and 100,000 horses' worth of remains (Olsen 1996a:43–45). Because of excessive predation, after the end of the Ice Age, horses in Europe became more and more scarce, and by the Neolithic (8,000–4,500 BC), it appears that they had completely disappeared from the majority of the continent, with only a few small enclaves remaining in Spain and central Europe. Although they vary in size, the same horse species that was historically prevalent in the west has been found to stretch into Central Asia to the east. Horses continued to be common and thrived as steppe animals in the plains of Russia and the Ukraine. Thus, the wild horse survived in the Old World into the Holocene despite intense hunting and dramatic environmental change. The presence of wild horses on the steppes persisted in more recent classical periods, according to Greek and Roman historians. The aristocracy of eastern Europe hunted tarpans, or wild horses, during the Middle Ages. And the Manchus are said to have slain hundreds of wild horses in Mongolia in the eighteenth century during an imperial

hunt (Bouman and Bouman 1994:7-8). Numerous deep-asia exploration missions were planned under the Russian tsars, the most well-known of which was led by the Polish geographer Colonel Nikolai Michailovich Przewalski. He acquired the hide and skull of a wild horse from Kirghiz nomads, and the formal name Equus ferus przewalskii was given to it in 1881 at the Zoological Museum of the Academy of Science of St. Petersburg.

Today, we are aware that Equus ferus has a compact body and measures between 12 and 14 hands at the withers build, a concave skull, and a dun-colored coat. In the winter, a shaggy ashen coat is produced to survive the cold. The Przewalski horse has an upright mane that is rarely longer than 20 cm, just like in Paleolithic parietal art. Sharp zebra markings can be seen on the lower leg, and a shoulder or half shoulder stripe can occasionally be seen running from the mane along the back to the bottom portion of the tail. Wanderings are governed by the need for food. The horse knows how to dig out vegetation from under the snow with its powerful feet. The wild horse, although having the ability to last two to four days without water, avoids it. hole reliance in winter by using snowmelt pools. In the summer, it also collects water by making holes in salt brine pans with its hoof (Mohr 1971:41, 45, 59, 66). Horses can see more than 300 degrees in all directions when they are grazing with their heads down (Houpt and Boyd 1994:230). A horse lunges forward when confronted by a challenger to deliver lightning bites in an effort to knock the adversary down. The dominant stallion keeps his downed opponent there and may keep fighting until his foe's legs are broken, skin and ears are torn to pieces, and his entrails are torn out. A group of wild horses flees in a single file when they become alarmed, with a young stallion in the front and foals in the middle. The dominant stallion takes up a position on the predator's flank or, if being pursued from behind, guards

the back. The mother of a young foal will first whinnie at it to encourage it when it falls behind. But the stallion is the one who pushes the foal forward by kicking threateningly at the air or tossing the foal into the air to invigorate it. He also pulls the foal by seizing it by the withers with his teeth. A mare will kick with her hind legs in a similar manner to how a stallion will turn to confront a predator by rearing up and striking it with his hooves (Mohr 1971:67, 72–73).

Many European zoologists were interested in the reports made by explorers in the nineteenth century about still-existing wild horses in eastern Asia. But even with the assistance of Asian nomads early attempts to capture the wild horse from the Altai alive were unsuccessful. Weeks would pass before a steppe horse was observed, and whenever they were, the animals would vanish like a windstorm. Finally, the only practical option was to make an effort to separate the young foals from the family band in the early spring. This was done with the urak/arkan (a long stick with a loop of rope at the end), which was achieved after a protracted chase in which frequent remounts were necessary. These small animals were bagged to be carried one on either side of a camel to the Trans-Siberian railroad for transit to European zoos and reserves. They were kept alive on domestic mares' milk supplemented by goats' and sheep's milk. Within the 1901 expedition captured 52 foals. Such a catch required the raiding of at least 25 harems and the shooting of adult animals. Only 28 of the original 52 foals caught made it to Europe alive as a result of this pitifully mistaken all-out attempt to preserve the wild species (Bouman and Bouman 1994:19–24). However, before Baron Friedrich von Falz-Fein, a rancher in the Ukraine, had successfully taught an imported wild stallion to be ridden, the number of captive wild horses in Russia was severely reduced during the Bolshevik revolution (Mohr 1971:69). Many more Przewalski horses will be wiped out across Europe by World

War II later in the twentieth century. Small-scale breeding of Przewalski wild horses in solitary zoos was unsuccessful at first. In the long run, consanguineous coatings and the overuse of particular stud stallions combined to have negative genetic effects that increased juvenile mortality, decreased life expectancy, and decreased the fitness of succeeding generations (Ballou 1994:102, 107). But as guidelines for an extensive program of international animal exchange were developed, placing a strong emphasis on outcrossing to preserve the viability of the gene pool, propagation in captivity gradually became more systematically organized. This was made possible by Volf's International Studbook and Bouman's computerized pedigree card system. Success was so great that by 1990, there were 961 wild horses kept in captivity in 33 different nations (Bouman and Bouman 1994:31–35; Wakefield and Knowles 1992:22).

However, despite improvements in zoos, there were still problems in the wild. Zoologists have noted the existence of multiple bands of wild horses in Mongolia in the 1950s, with a total population that may have reached 100. The rapid-fire modern rifle, however, made its way to even the most remote areas as pastoralism and predation increased, enabling hunters to swiftly eliminate an entire herd of wild horses. Only irregular sightings and infrequent tracks of wild horses were still visible by the 1960s (Mohr 1971:32). It was believed that the Przewalski horse was finally extinct in the wild after 1968 because no additional sightings of wild horses could be substantiated (Bouman and Bouman 1994:31). However, there is a growing international zoo. With the increase in population, it was now possible to return zoo animals to their former habitat on the Asian steppes. A large number of largely unrelated individuals were enlisted to enable the transfer of a heterozygotic gene pool from captivity to the steppe. The goal was to establish the species in a safe wild habitat with minimal wild predator pressure and no contact

with domestic or stray horses in order to prevent hybridization (Knowles and Wakefield 1992:23). In 1988, semi-reserves were first created in Xinjiang, China, then in 1990, in Mongolia. Because the wild horse is a common subject in many of their traditional songs and poems, the Mongolians welcomed the Przewalski horses with great pride and joy. The horses gradually become accustomed to site and surrounding foliage. Most significantly, they formed a typical social structure by effectively adjusting to one another and cooperating as cohesive units to fend off attacks from wolves, lynxes, and polecats. They are currently being monitored by local nomads who have received training to serve as reserve scouts (Bouman, Bouman, and Boyd 1994:255-262). Similar reserves for the preservation of the species Equus ferus have been formed in other nations as the number of captive wild horses rises to over 1,000 worldwide. When there are so many as natural species disappear from the earth, one can only hope that this effort to save the Equus ferus przewalskii, or takhi as it is known in Mongolia, will be successful.

Conclusion

As a brief summary of the evolution of wild horses from the Eocene to the present, it is evident that the horse has undergone significant anatomical changes over the previous 60 million years as a result of intense selective pressures, guaranteeing it remarkable speed, strength, and endurance. Additionally, via its repeated global migrations, it has developed climatic adaptations to extremes in temperature, height, and aridity on numerous continents. The horse's equid digestive system enables the animal to thrive on the lowest grade vegetation thrives successfully in a wide variety of environments. Homo, whose own six million or so years of bipedal evolution had produced exceptional brain growth, would eventually come to recognize and make use of all these amazing traits of the wild horse. Man would domesticate

Equus caballus, a highly intelligent but agonizingly slow biped, and learn to use its speed and strength for his own benefit. The remainder of this book details that adventure—the 6,000-year domestication of horses by man—a collaboration between the smartest biped and the quickest quadruped.

References

Inge and Jan Bouman 1994; Bouman, *Inge The Przewalski's Horse's History*. Horse: The History and Biology of an Endangered Species by Pzewalski. Pages 5–38 in

Lee Boyd and Katherine A. Houpt, editors. State University of Albany Duncan, Patrick,and Chris Gakahu 1992 Plains Zebras (Equus burchelli Gray). International Union for Conservation of Natural and Natural Resources.

Hulbert, Richard C., Jr. *1996 The ancestry of the horse*. In Horses Through Time. Sandra L.Olsen, ed.Pp.11-34. Boulder, CO: Roberts Rinehart.

Simpson,George Gaylord. *1951 Horses: The story of the Horse Familyin the modern world and through sixty Million years of history*. New Tork: Oxford Universuty Press.

MacFadden, Bruce J. 1992. *Fossile Horses: Systamatics, Paleobiology, and Evolution of the Family Equidea*. Ne York: Cambridge University Press.

Mohr, Erna 1971. *The Asiatic Wild Horse; Equus przewalkii Poliakoff 1881*. London: Allen. Moory, P.R.S.

Novellie, Peter, Peter Lloyd, and Eugene Joubert 1992. *Mountain Zebras*. International Union for Conseravation of Nature and Natural Resources.

Rowen, Mary, and Joshua Ginsberg 1992. *Grevy's Zebras (Equus burchelli Gray)*. International Union for Conservation of Natural and Natural Resources.

Woodward, Susan 1996. *The Living Relatives of the Horse*. In Horse Through Time. Sandra L. Olsen, ed.Pp. 191-208. Boulder, CO: Roberts Rinehart.