Chapter I-2

Will the Real Horse Please Stand Up!

Having covered some of the events in the past fifty-some million years that led to the evolution of the *Equus* would seem to make the story of the last four or five million years that it took the *Equus* to turn into the modern horse a simple matter. Unfortunately, there are many critical voids of information in the years that preceded the point in time 6,000 years ago when mankind began the process of more intense domestication.

The *Equus* evolved millions of years ago in the same continent that saw the creation of all its forefathers. Incredibly, there have been over 60 species of *Equus* named in North America alone. Although that is surely an overly optimistic figure, it does point out with what gusto this genus adapted to its place of origin.

The first known *Equus* was a primitive species that still had traces of very slight facial fossae. They were thickly built, with acute structural angles that gave them a short, choppy stride. They possessed short, thin skulls, much like those found in today's donkeys. Many people feel that most likely these first *Equus* had a partially striped pattern on their hair coat. In 1930, fossils from such a specimen were classified as *Equus simplicidens* and due to the location of the find, laymen referred to it as the "Hagerman Horse".

The term "horse" is used loosely in the literature, and as a result it has promoted much confusion over the years. The term "equid" refers to all genera that belong to the *Equidae* family. In essence, everything that has evolved from *Hyracotherium* onward is an equid. Fifty-two million years after the origin of *Hyracotherium*, the *Equus* genus makes it first appearance and over the past four to five million years there have been a whole host of species that belong to the *Equus* genus, of which today only seven basic ones survive (nine if we take into account domestic variants that were assigned specific names).

One of those nine species is *Equus caballus*, and that is THE horse we are all familiar with. This is pretty common knowledge around the horse world, but what is less known is that the domestic horse's wild counterpart deserves the description of "horse" just as much, even though it is recognized in the literature as the *Equus ferus*. Under the strictest interpretation of taxonomic nomenclature the domestic animal should use the same species name as its wild ancestor with a clarification of "forma domestica" after the species name. In the truest sense, no domestic variety should be designated its own name as a species because by definition they are NOT a species, but rather they part of a species from which specimens were taken for domestication. Still, we can't change the fact that there were 17 mammals that received systematic classification prior to, or simultaneously with, their corresponding wild form and thus for around two centuries those names have been of common usage in verbal and written history. In respect of the familiarity with those names and in hopes of causing less confusion in the lay world, a 2003 ruling by the International Commission on Zoological Nomenclature opted that those 17 domestic derivatives maintain their original specific names and their wild relatives be assigned the next available name for that species.

So, technically when laymen refer to the *Equus simplicidens* as the "Hagerman HORSE" this is an erroneous use of the word. Next time we read a news bulletin that a horse fossil has been found we should not be surprised it is not even from the *Equus* genus. When an infinite number of textbooks state that Columbus reintroduced the horse to the Americas, technically this would imply that *Equus caballus* or better expressed, *Equus ferus*, had roamed all over the Western Hemisphere before. If the various *Equus* species that went extinct 8-10,000 years ago in North and South America had stripes, light colored muzzles and bellies, long ears, no

Figure I.28
The Hagerman "Horse" may have looked more like a zebra than what we know today as a horse.

forelock, only a tuft at the end of the tail, and brayed instead of neighed, we might be hard pressed to identify them as horses, even if they shared the same *Equus* genus. Still, we do know that many "caballine" *Equus* species made their presence in North America over the past million and a half years, and it may be that in learning more about them, some could classify as direct ancestors of *Equus caballus* or subtypes of *Equus ferus* that merit the identification of being "horses".

In fact, it is probable that as time offers us more accurate analytical methods, scientist may determine that there were many more subtypes of the *Equus ferus* than we ever imagined.

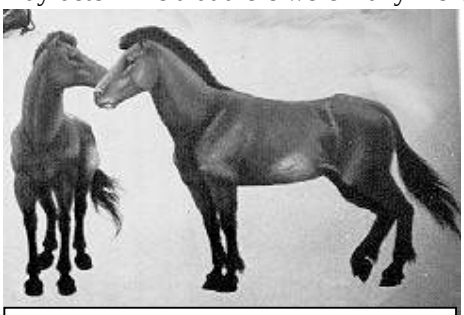


Figure I. 29 *Equus ferus* is the wild ancestor of the domesticated horse that has long been extinct.

Many discoveries of parts of equids skeletons in areas of the world where we have no evidence of the presence of *Equus ferus* can result in christening these specimens with names of new species. It is probable that in the face of global warming new exposed lands will offer more genetic close-ups through mitochondrial DNA loop sequencing, microsatellite and Y-chromosome analysis and other yet-to-be discovered methods. With these scientific advances we will determine a great number subspecies and unique genotypes that will expand our understanding of what types of "true horses" existed in the past and what parts of the world they inhabited. Surely such information will provide a more accurate reality of the various *Equus* species that went extinct in North and South America as well. So, in the meantime, in so far as this book is concerned and this chapter's title (from the slogan on the old TV show "To Tell the Truth") alludes to, the REAL horse is the one and only *Equus caballus*, or where applicable its wild counterpart *Equus ferus*, with whatever limitations our present knowledge may impose. Now that this has been clarified, let's get on with our story!

Equus Overwhelms the World

The *Equus* quickly mushroomed out to at least 12 different species and four equid groups. Some found their way down to South America, where the *Parahipparion*, *Onohippidium*, *Amerihippus* and *Hippidion* also developed. Throughout the Western Hemisphere, other equids still proliferated as the *Equus* coexisted with various other equid genera of the epoch. Even other successful *Monodactyls* such as the *Astrohippus* shared the turf with the *Equus*. It is supposed that around 2.6 million years ago the *Equus* took advantage of the first major glaciations of the epoch to migrate across to Asia, and eventually spread to the Middle East, Europe and Africa. This gave rise to more new species that adapted to a variety of conditions throughout the world. Sometime in the last million years, the cooler regions of North America and Eurasia with steppes and forests probably became the breeding ground for the original "true" (*Equus caballus*) horses that man would come to domesticate. The more arid regions of the world gave rise to the asses and the rich savannahs of Africa became the home of the zebras and quagga.

The fact that this genus was so profusely distributed throughout the world would indicate its adaptability to a diversity of climates, terrains and qualities of forage. It would also tend to indicate the propensity to move about over large areas. In part, covering large areas of land was predetermined by the equid's specialization in low-quality forages that they needed to consume in large quantities. Nonetheless, such mobility was also very possibly the result of the equine social structure that defined that stallions keep small numbers of mares isolated in a continually redefined occupational territory of very low animal density. This conduct assured less susceptibility to parasites, less transmission of disease and less immunosuppression due to the stress of excessive numbers in a herd. The short reign of constantly challenged herd stallions and the exodus of fillies after reaching puberty also favored a greater genetic variety that resulted in an increased heterozygosity. This, in turn, gave rise to more vigor in meeting the challenges of life.

If the climatic conditions and adaptability of the *Equus* favored the multiplication of this genus, it became necessary that the added numbers expand to other areas where new herd nuclei could be formed. A large number of small herds offered more inherited diversity to adapt to new or changing environmental conditions. This not only explains the large extension of *Equus* throughout the world, but also the fact that they existed in numbers of low animal density everywhere they went.

The Abundant Evidence of the Prehistoric Horse in Europe

In Europe there is much evidence of the interest prehistoric man had in horses. One of the most amazing discoveries was made in the Volgelherd Cave in Germany. A small ivory sculpture of a horse that was made from the tusk of a mammoth was found and dated at 30,000 years old!! It is theorized that Cro-Magnon men carried this good luck charm with them in hopes of making a kill that would nourish them. Such a conclusion is easily made when one realizes that even today, in primitive cultures, the idea of visualizing what one wants is a common way of pursuing goals. In Native American markets in the Andean highlands, people still purchase toy symbols of a cow, a truck, a home or whatever other desire they have for the coming year. Thus it's plausible that prehistoric man also associated artistic representations of horses with increasing their probability of capturing or killing one for their needs.

Southwestern Europe is full of such representations. The findings outside the rock shelters of Solutré, France substantiate man's dependency on equines some 15,000-25,000 years ago. Cave paintings in Lascaux and Dordogne, France provide illustrations of Mesolithic horses around 18,000 years ago. Just recently, in this past decade, 20,000 year-old paintings of horses were also found in the Ardéche Gorge in France.

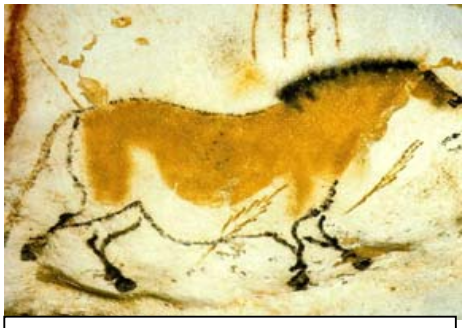


Figure I.30 Prehistoric rock art depicting *Equus sp*. from the caves in Lascaux & Dordogne in FR

In Spain there was a fabulous discovery inside "La Pileta" cave in Benaoján, Málaga, near Ronda. In the aptly named "Sierra de las Yeguas", the discovery provided a look at early art depicting horses of various epochs. The black paintings are estimated to be 10,000-20,000 years old, while the colored ones are thought to have been done 20,000-30,000 years ago. The "Pasiega" cave in Puente Viesgo, Santander; the Parpalló cave in Gandía, Valencia; and the paintings of "Minateda" in Albacete all indicate that the prehistoric man of the Iberian Peninsula closely observed, hunted and very likely initiated a crude domestication of equines.

Significant numbers of equids have always been associated with North America. After all, this was the cradle of the birth and development of the genus. It seems ironic, then, that for many years there were serious doubts if the prehistoric men of North America took any interest in this genus as a source of food. The wealth of evidence that pointed to concentrations of equine bones in ancient European settlements did not seem to have a matching reality in North America. An extremely interesting article appeared in the 3rd of May, 2001 issue of *Daily University Science News* (UniSci). One of North America's richest archaeological fields was discovered in southern Alberta. At this 11,000-13,000 year-old site, University of Calgary personnel uncovered the skeleton of an *Equus conversidens* equid with butcher marks on the bones made by Clovis men. They also found two 11,300 year-old spearheads with protein residues that coincided with the ancient *Equus sp*. At last, evidence that in North America *Homo sapiens* were also in part responsible for the reduction of equid numbers. Of course, conclusions were quickly made that over-hunting was surely partly responsible for the extinction of the equids in the Americas.

In spite of the millions of years in which equids roamed over the lands of North America, it was not until the *Equus* came into existence that geological changes took place that finally permitted migrations to South America. Immediately, two varieties of equids made their way into this continent that had been void of any equids in its past. It would take another million

years before the *Equus* would join the *Hippidion* and *Onohippidium* in South America, and yet another 600,000 years or more before "caballine" *Equus* species would cross over from North America to Asia.

Paleontological findings all the way to the tip of South America show that equid life was closely related to human activity. Moreover, like European findings, much evidence points to the fact that they were a source of food for *Homo sapiens* throughout this continent. Fossil bones found in the Palli-Aike, Cerro Sota, and Posonby, in the Magellanic region in southern-most Chile and Argentina, indicate that various tribes of Paleo-Indians hunted the native equids heavily between 10,000 and 12,000 years ago. Farther north in Laguna Tagua-Tagua, Chilean fossils found in the bed of an ancient lagoon gave rise to the knowledge that around 11,000 years ago humans clubbed to death mastodons and *Equus sp.* that were hampered by the muddy terrain around the receding body of water. Near Los Vilos en central Chile, in the Quero sites I (between 12,000 and 22,500 yrs. BP*) and sites II (10,500-12,000 yrs. BP) evidence of human and *Equus* activity concurred. Even in the desert plains (pampas) of El Tamarugal that are now part of the Atacama Desert region and surrounding highland valleys, R.Casamiquela found evidence of Pleistocenic *Equus sp.*

(*) BP is a much used reference in archaeology that refers to "before the present"

What You Always Wanted to Know: Why Horses Disappeared from the Americas!!

There is no questioning that the *Equus* genus extended itself all over the Americas, Asia, Europe and Africa. However, this success story gave way to one of the world's great mysteries. Between 10,000 and 11,000 years ago, this genus that was the end product of over 55 million years of evolution and thrived just about everywhere, suddenly almost disappeared from the face of the Earth. Indeed it did vanish, along with many other large mammals, from the starting point of its existence. In the entire Western Hemisphere, where the genus is thought to have originated and multiplied, not a single equid genus survived!! Prior to this time, in North America alone there were at least 12 valid species of Pleistocene equids.

Just as strange were the changes taking place in the Northern Hemisphere elsewhere in the globe, where the *Equus* genus had consistently migrated extensively. Now the lands north of the equator were reduced to an insignificant equid inventory. The African continent and perhaps the Middle East contained precious few species of asses and zebras that seemed the only stronghold of the *Equus* genera in the world. In fact, some researchers feel that had it not been for a small number of specimens that continued to exist in isolated savannahs in Central Asia, and man's timely interest in domesticating these remaining horses, the repopulation of the *Equus caballus* throughout the world may not have taken place. Perhaps it's a slight exaggeration to say that the entire *Equus* genus toyed with extinction, but there is no doubt that the species that gave rise to the modern horse came incredibly close to oblivion.

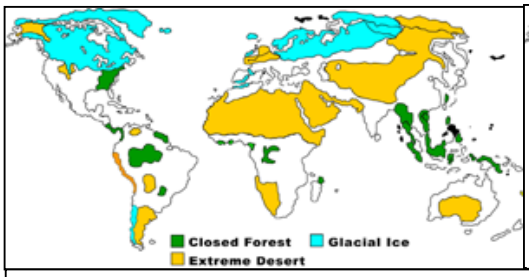
Figure I.31 There are many examples in the present that give living proof that feral and domestic horses can adapt very well to a woodlands environment.

The most widely held theory is that the warmer climates that followed the last Ice Age were responsible for the propagation of great forests that substituted the natural grassland habitats of the *Equus*. The evolution of the ultimate inhabitant of prairies with low-quality grasses now found themselves without a suitable environment. In Europe, this forced the surviving equids farther eastward to the grasslands of Ukraine, Mongolia and Siberia. The cooler climate of Siberia may have been one of the last strongholds for

Eurasian grasslands in a world that saw average temperatures increase by more than 2.5 degrees Centigrade.

This theory is troublesome for various reasons. It may have been a contributing factor, but I find it hard to believe that these environmental changes could almost eliminate such an adaptable animal from existence. For over 15 million years, these efficient grazers had prevailed in spite of radical climatic changes of every conceivable type. They persisted in a diversity of environments that were a product of an era that was plagued by continual cold glacial and warm inter-glacial periods. During the last 2.5 million years the representatives of the *Equus* genus around the world had seen the Biber, Donau, Giunz, Midel, Riss and Wiurm Ice Ages come and go. It is difficult to conceive that global warming would eliminate all suitable grasslands in entire continents with a variety of soil types, not all of which are suitable for the growth of woodlands.

The fact is that it didn't. Granted 18 million years ago the precious few forests were in eastern North America, a portion of the Amazon that is about one third of the area it now covers, a minute part of central Africa and the tip of southwestern Asia. So to now see nearly half of North America, one third of South America, two-thirds of Eurasia and one fifth of Africa with closed forests with more than 70% canopy cover, is certainly a drastic ecological change. Still, this reality presented many options of where the equids could survive in normal grasslands throughout the world.



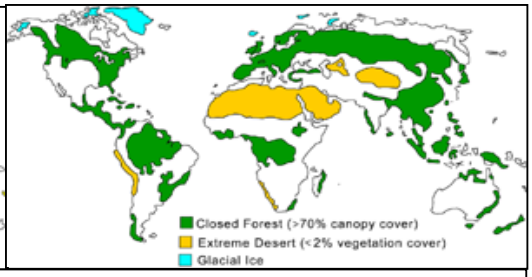


Figure I.32 **Figure I.33**

Figure I.32 shows the distribution of forest, deserts and glacial ice 18,000 years before the present. It is clear that even with large ice fields and expanded deserts there would have been alternatives in conifers, grasslands, scrub/grasses, savannahs and semi deserts present in the remaining areas of the world for the *Equus* genus to survive in both the Americas and Eurasia. Figure I.33 offers a comparison with the distribution of these ecosystems in the present world.

Nor does it seem logical that equids could not adapt to brush and forest terrains that are successfully inhabited by them today. Less logical is the simultaneous disappearance of browsing equids that would have found this vegetative transformation ideally suited to their needs. Moreover, these changes from grasslands to forests occur slow enough to give migratory grazing animals plenty of time to look for better alternatives.

Since equids have a less demanding digestive system than most other herbivores, I must think along the lines that whatever world catastrophe took place in the Western Hemisphere must have drastically lowered the vegetative food supply. A lack of nutrients would certainly be a more reasonable alternative to annihilate a genus than contemplating a change in nutrient presentation, especially since the change was to more nutritious foliage. Although we came to our conclusions independently, I was pleased to come across an article in the journal *Nature* by R. Dale Guthrie. Dr. Guthrie's fascinating work shows that horses underwent a rapid decline in body size before extinction. He attributes this to changes in vegetative supplies that coincide with climatical changes. Perhaps this last part of the conclusion is what I would like to understand better, as simply thinking of the normal transitions in global climatical changes does not seem like a reason that could prevent equines from making the necessary adjustments to adapt. Something radical must have taken place in the Americas.

A possible explanation that may be related to the warmer climates that existed during this time may have a relationship with extreme droughts. No rainfall, dwindling sources of drinking water, as well as a scarcity of vegetative growth would cause serious havoc to herbivores. Under such conditions, plains, steppes or savannahs would be more prone to the formations of

dust clouds that further reduced the penetration of light and limited photosynthesis for plant growth. Stressed plants would find themselves more prone to disease, vulnerable to insect attacks and life-threateningly low in water content. Drought-stricken forests would have thick underbrush of dried kindling and combustible trees. Dried savannahs would be equally inflammable. All the aforementioned would make huge tracts of land more vulnerable to fires.

A dry environment that was conducive to dust clouds or light impediment from the smoke of brush fires added to a wide distribution of airborne ash in an era of increased world volcanic activity, could all have direct and indirect effects on equid reproduction. The reduced nutrient availability would affect the most energy demanding individuals such as stallions, gestating and lactating mares. The faster turnaround of stallions would lead to more neonate deaths, as many wild stallions are fatally aggressive towards the newborn foals from the previous herd leader. Nutrient deficiencies would augment periods of anestrous and reduce fertility even if estrous was present. The lack of sunlight penetration could have had an effect on the functions of the pineal gland also causing a reduced incidence of estrous cycles.

The effect of volcanic ash may very well be a valid variable that has not received enough attention. This subject was particularly brought to light by the fate of the Icelandic Horse when volcanic activity (this island has 18 volcanoes in its midst) affected the island they inhabited in 1782. In the following two years 70% of the more than 60,000 horses on the island died from starvation and poisoning from volcanic ash (Hendricks, B.L., 1995, pp. 232). Of course, aside from the tephratic airborne debris the toxic sulfur dioxide gases that are released at the time of eruption can be an instant cause of death. Ash falls can cover large areas with significant amounts of abrasive and indigestible inorganic matter. It is theorized that if a super volcano like the one in Yellowstone were to erupt, the entire United States would be covered by no less than 1 cm ($2/5^{th}$ of an inch) of ash and in a radius of hundreds of kilometers around the volcano there would be a mass destruction of life.

In conversations with one of Chile's most distinguished archaeologist, Dr. Lauraro Nuñez, I was interested in his comment that his scientific community was suspect that the equids may have disappeared from the meridional portion of South America due to their greater susceptibility to volcanic ash which possibly contaminated their sources of drinking water. Eleven to 20,000 years ago the entire continent went through a period of much volcanic activity and this may explain why South America was wiped clean of equids where as Africa was not.

It is certainly possible for intense volcanic activity to alter global climate for years. Around 251 million years ago immense volcanic activity in Siberia was largely responsible for mass extinction of 90% of the species in the world. The volcanic dust can remain in aerial suspension for years inhibiting the normal penetration of light and causing a cooling in all of earth. The fact that 10,000 to 12,000 years ago, the average temperature of the earth dropped suddenly by a full degree centigrade (this 1,000 year ice age is referred to as the Younger Dryas Cooling Period), may be an indicator that abnormal volcanic activity had taken place at the time. It should not surprise us that intense volcanic activity is possible in the Western Hemisphere. South America alone contains 215 volcanoes, more than any other region of the world. The 122 conical stratovolcanoes located therein, are also a regional world record. Mexico adds another 11 volcanoes while in the United States there are more than 100 additional ones that help make the Americas a tectonic time bomb in the geologic time table.

Recently, there has been news that the cause for the extinction of a great number of animal species 10,000 years ago may be similar to the one that has explained the disappearance of the dinosaurs 65 million years ago. Dr. Peter Schultz a planetary geologist from Brown University has informed that there is reason to believe that 12,900 years ago North America may have been hit by sizeable asteroid, comet or meteorite that had a profound outcome on world climate as it laid down a three-centimeter carbon-rich "black layer" with elements of soot, charcoal and glass-like carbon over the 10 North American Clovis sites studied. It is also speculated that it caused massive wildfires.

These conclusions by a group of 26 researchers including Dr. Schultz presented in the Proceedings of the National Academy of Sciences stipulated that along with direct hits there may have been low density extraterrestrial airburst in the upper atmosphere. Nevertheless, the ten Rio Cuarto craters in Argentina are proof that a low angle direct hits did occur 10,000 years

ago in South America as well. Much of what we have reasoned about how volcanoes can affect the needs of plants and animals through diminishing solar penetration would also apply to the consequences of a major hit by an extraterrestrial body that causes a massive cloud of impact debris. Large extraterrestrial hits could trigger volcanic activity and there is no doubt that mega tsunamis are also a related catastrophe for many forms of life.

In time we will know if such an event was the major or complementary cause for a catastrophic event on earth that dramatically reduced the nutrient sources for animals over a short period of time. In my mind, whatever explains the occurrence of radical changes would make much more sense as a cause for the disappearance of the equids in the Americas. After all, this was the continent where they originated and evolved for more than 50 million years, adapting to a wide array of gradual changes in their ecosystems.

Many researchers are of the opinion that man had an influential role in the extinction of equids in most parts of the world. Trying to establish some connection seems reasonable, since the arrival of significant numbers of Asian hunters to North America coincides with the epoch that many species were eliminated from the continent. The rapid expansion of man through the Americas, in a general sense, parallels the demise of many species that had up to then prevailed. With the number of equid bones that have been found around the living quarters of early man throughout the world, we must assume that they were among their preferred prey. Then again, most studies have shown the equids have usually made up a minor part of Cro-Magnon man's diet. Moreover, there is a paradox in the fact that the continent where the most evidence exists of human consumption of equids is precisely where the *Equus caballus* survived.

The fact that the caballine equids had a character that made them good candidates for domestication may have facilitated halter breaking individuals that could act as attractants for other members of their species to come within range of human offensives. Such a tactic, which takes advantage of their gregarious nature, is commonplace today in trying to approach particularly hard-to-catch individuals. In fact, there is evidence that early domestication took place in a minute number of individuals, while a large number of bones provided evidence that many members of the same species had been a part of the human diet. It seems reasonable that man's first effort to domesticate equids in wooded areas may have been an effort to hunt them more effectively. Later, this may have led to keeping some animals close so that they could be milked daily or slaughtered when needed. Cave paintings that depicted horses with halters and drawings of equids being held by men with ropes, as well as tools for braiding horsehair into rope, are correlated to long before man started using the *Equus sp*. for transportation.

Regardless of how easy a prey the horse was, or how much preference man had for its meat, or how efficient men became at killing equids, it seems far-fetched to think that a sparse population of *Homo sapiens* hunters could possibly eliminate a genus throughout an entire continent, not to mention most of the world. The answer once again may be related to the warm climatic conditions that prevailed when equid numbers were so drastically reduced.

In fact, the global warming came after the severe droughts over most of the world that were caused by the cool and dry Ice Age climate. In the plains, steppes and savannahs that equids inhabited in particular, these areas would be particularly susceptible to fire. It is conceivable that, in man's effort to hunt, the tool of fire may have been used as a means of directing game in a specific area, causing death through the panic-stricken efforts to escape engulfing flames, or perhaps simply causing a lack of nutrients that would lead to a large number of weaker animals that became easy game.

One ancient archaeological site found thousands of bison at the foot of a cliff where something as threatening as fire could have forced so many animals to jump to their death. A famous 1872 French novel speculated that in the famous cliffs of Solutré something similar happened with horses. This has since been disproven, but there is no denying that wherever the topography made it possible, prehistoric men probably resorted to this alternative as one of their means of obtaining needed nutrients. Similar speculations have been made for the use of fire in driving wild animals deep into the boggy terrain around lagoons that immobilized large herbivores that were terminated with rudimentary weapons or large rocks. Likewise, an ancient method of killing gregarious animals called for herding them through narrow gorges where hunters showered down boulders from the ridges above. Tactically started fires could have been

an effective means of redirecting the desired prey through the constricted passageway they would normally shy away from.

Figure I.34 **Figure I.35**
The original theory at the archaeological site of Solutré, France that thought Paleolithic hunters drove horses off cliffs has now been replaced by the idea that horses were ambushed as they passed between two large boulders along the southern flank of the Roche. Nevertheless, there is evidence in other parts of the world that driving animals off cliffs was carried out to kill prey.

Under extremely dry conditions, these fires could have spread rapidly out of control, further devastating in short order an environment that was already limited in nutrients. If such a practice became a popular alternative, it might also explain the swift expansion of nomadic men throughout the continents. After destroying one area, it became eminent to follow the herds to new grounds where the procedure could be repeated to create easily obtained prey elsewhere.

Inevitably, this topic forces one to mull over the idea of why certain animals of the epoch survived and others did not. On both the side of those that subsisted and those that perished, we find carnivores and herbivores, as well as predators and prey. Within such a panorama I think it is easy to consider that the herbivores with the largest numbers had the greatest possibility of having representatives that withstood the hardships until conditions changed and numbers could proliferate once again. Not only were the numbers in their favor, but so were the essentials for reproduction. The large herds maintained a greater number of individuals from both sexes living in harmony. Therefore, there was a good probability of survivors being able to continue to procreate.

On the other hand, equids by definition lived in small herds where one dominant adult male was the sole stallion for the herd. The fact that their social structure called for small groups that were well separated from one another meant that overall numbers of the species were not nearly as great as the huge herds of other grazers with a more communal social structure. For example, in the early 1800's it was estimated that in the western United States there was a population of more than 60 million bison grazing open ranges. At the same time, the feral horse inventory was a mere three million, meaning that there were 20 bison for every horse. Under natural or instigated conditions that radically diminished the availability of nutrients, it would be the species with the largest population that would have the best probability of having some specimens remaining when the crisis was over.

Furthermore, the digestive system that provided the equids with an advantage over ruminants as grazers, would now work against them under conditions of nutrient scarcity. Faced with limited resources, equids could no longer make up for their lower digestive efficiency by increased consumption of foodstuffs. The more efficient digestive system of the ruminants better prepared them to survive in these conditions where so little forage was available.

The larger numbers of ruminants also favored their dominance over available turf. The horns developed by ruminants as a means of defense that compensated their lack of equine swiftness were now a more effective means of imposing their presence in limited grazing areas. Nothing points out the effectiveness of ruminants under these meager conditions more than the fact that enough medium-to-small sized ruminants survived to give rise to around 200 species of ruminants today. On the contrary, only seven wild equid species, all from the sole surviving genus, *Equus*, are still in existence.

Under a short supply of nutrients, the larger animals requiring tremendous amounts of feed to maintain their extreme corporal size and weight would also fall victim to an inhospitable environment. The mastodons (*Mammut americanum*), the mammoth (*Mannuthus sp.*), the camels (*Camelops hesternus* and *C. minidokae*), the large llama (*Limini sp.*), the short-faced bear (*Arctodus sp.*), the giant ground sloth (*Glosotherium harlani*), the giant elk (*Megaloceros sp.*), the shaggy rhinoceros (*Coelodonta antiquitatis*), the hippopotamus (*Hippopotamus sp.*), and the original giant bison (*Bison antiquus*), etc. would all fall by the wayside. All would have difficulty meeting their nutritional requirements, some would not be fast enough for predators that had evolved greater speeds and yet others would not be well-suited for migrating long distances to new pastures. A common denominator in the large herbivores that went extinct was the fact that, like the equids, they were usually animals with small social groups that resulted in a more restricted population.

Fig. I.36 *Mylodon darwini* is a type of giant ground sloth that coexisted with *Equus sp.* in the southern tip of Chile before they both became extinct.

Perhaps the animal that best symbolizes all the limitations that facilitated extinction is the giant ground sloth. This was a huge, solitary, shaggy, slow moving, grass-eating mammal with a tremendous demand to nourish its 6-foot tall and 1,587 kg (3,500 lbs.) body. In the face of nutrient scarcity, such animals with great corporal size and weight with limited mobility were doomed to disappear. Animals such as the camel, which had originated in North America 43 million years ago, were no longer able to cope with the drastic changes in habitat caused by man. Neither were the massive mastodons that had migrated from Africa where they successfully procreated for 15 million years. The most recent newcomer to the American prairies was the bison. It had crossed over from Asia just 280,000 years before with a much bigger body size. Although the huge original species went extinct, its descendant, the smaller bison (*Bos bison*) we know today, developed into a reduced version that accumulated extraordinary numbers.

Large predators would also succumb to the same demands of the instigated crisis. With a significant decline in numbers of prey animals, and lack of suitable cover to enable them to stalk within attacking distance of their prey, these carnivores were less effective in meeting their needs. Additionally, their territorial nature and poor suitability to follow the migrating herds over long distances to new pastures also contributed to their disappearance. Past "killing machines", such as the saber-toothed tiger (*Smilodon californicus* and *S. fatalis* in North America and *S. neogaeus* in South America), found their insatiable appetites impossible to satisfy. Where as, the leggier and more mobile gray wolf (*Canis lupus*) survived, the short-legged and bulkier dire wolf (*Canis dirus*) went extinct. The latter was probably less suited to migrating long distances and or speed demanding hunts. Basically, a bone crushing scavenger, the dire wolf was another creature that required being in areas of high animal density.

It seems that two variables-- the global warming and the presence of man's skillful use of fire -- coincided with the greatly diminished numbers of the *Equidae* genera and the near-extinction of the equine species in particular. The answer to the mystery of the disappearance of the horse in most of the world may have been under our noses the entire time. The oft-mentioned global warming (which led to the theorized smothering out of grasslands by the forests) and over hunting (which implies more kills than these species could compensate for through reproduction) are variables that seen in a different context, may offer a more plausible explanation. Interestingly, the disappearance and continuance of other genera have often confused the issue. Actually, these same clues permit consideration of a different conclusion that also confirms why man and climate may have been most responsible for the near-extinction of the horse.

Regardless of the reason behind their close brush with extinction, it is theorized that at some point perhaps the only surviving horses remained in central and western Siberia. During the last Ice Age it is curious that this was one part of the northern most latitudes that was not covered by ice. Many have theorized that eventually the **Tarpan** (*Equus ferus ferus*) of the

Ukraine and the **Przewalski horse** (*Equus przewalskii poliakov*) of Mongolia developed in the southern parts of Eastern Europe and Central Asia as migrating strains from the last surviving horses in Siberia. This seems a too simplistic conclusion when one realizes the complexity of so many variables that need to be considered. I will touch on that matter later, but for now let us concentrate on these two genotypes that most certainly survived the world crisis. There are some discrepancies as to how to classify the **Tarpan** and **Przewalski** among the caballine forms of *Equus*. This topic merits our attention because of the differing phenotype and genotype of the supposed descendents now found in separate regions of the world.

I particularly want to delve into the specifics of **Przewalski** and **Tarpan** horses, the two most mentioned primitive horses that are recorded in the history of man (actually there may be others like the **Exmoor**, **Sorraia**, **Retuertas**, **Riwoqe**, etc. but we'll get into that later), because each of them have been claimed to be a dominating gene pool for one of two waves of influence across northern and southern Eurasia. I found it particularly interesting to the topic at hand that some authors proposed that through different modes of entry both these gene pools dead ended in the Iberian Peninsula, where centuries of historic developments later gave way to the forefathers of the horses of the Americas. If we are going to analyze where the origins of the **Chilean Horse** lie in the menagerie of horse types that penetrated and influenced the Iberian horse population, then it seems important that we start by understanding the main influences of the multiple horse types that propagated themselves throughout the Old World.

The "Real" Przewalski …Horse?

History often demonstrates how difficult it is to pin down facts that have been elusive realities before our very eyes for more years than seem possible. For around 980 years before the **Przewalski horse** was brought to light in the Zoological Museum of the Academy of Science in St. Petersburg, the first written description of the Przewalski horse had been made by a monk named Bodowa that lived in Tibet around 900 AD (Wakefield et. al. 2002). It would be over 500 years more before the **Przewalski horse** is thought to have been first been seen by European eyes. The privilege fell upon a Bavarian nobleman named Hans Schiltberger who found himself in unfortunate circumstances in the Tien Shan Mountains. During his travels he had been captured and then traded as a prisoner of war among various Asian tribes before obtaining his freedom and writing his memoirs in an unpublished document dated 1427. In this chronicle, he describes the **Przewalski horse** in great detail when referring to his years as a captive of the Mongol prince Egedi.

Another uncredited observer of the species was recently rediscovered. A description of the **Przewalski horse** was also made by the Scottish author John Bell in his 1763 publication *A Yourney from St. Petersburg to Pekin, (1719-1723).* This physician who was sent by Czar Peter the Great as an ambassador to China, also came upon herds of these Mongolian horses while traveling across Asia.

However, the first person to officially make mention of the **Przewalski horse** to the scientific community was the explorer Nikolai Mikailovich Przewalski. This career colonel was commissioned by the Russian Czar Alexander II to investigate the region of Central Asia. After bringing evidence of a skull and hide of a **Przewalski horse** from one of his first missions, in 1879, he claimed to have made his first sighting of horses the natives called Taki (also spelled Tachi, Takhi or Tag), which the rest of the world has come to know as the Asiatic Wild Horse or Mongolian Wild Horse. Since at the time it was thought that the Russian colonel had discovered the new species, his name was utilized in the scientific name (*Equus przewalskii*) it was assigned. In actuality, there were those that believed that the Colonel's brief encounter may have really been with some wild Mongolian asses. However, all skepticism about the existence of the wild horse herd was put to rest in 1889 when a hunting expedition of the brothers Grigory and Michael Grum-Grshimailo brought back accounts of having run into **Przewalski horses** on two occasions. They shot four horses, photographed a freshly killed specimen and took four hides, three skulls and part of a skeleton back as proof.

The news of the previously unknown wild horse rapidly spread across the world. Possibly an even greater interest existed since the last representative of the wild **Tarpan** horse (*Equus*

ferus ferus) had died in Askania Nova, in southern Russia, shortly before in 1876. Precisely from this same part of the world came the first efforts to obtain the first **Przewalski horse** in captivity. When Frederic von Falz-Fein initiated the efforts to confine wild specimens, his representatives had to settle for young foals, since the adult animals proved impossible to catch. If this was the conclusion of men in the late 1800's, it certainly makes one wonder about the validity of prehistoric over-hunting causing sufficient numbers of directly imposed deaths to explain the near extinction of horses and other equids.

In the following years, a continuing effort was made to capture **Przewalski horse** foals that were then raised on nurse mares before being shipped to private estates and zoos all over the world. Unfortunately, many of these foals died before or after arriving at their destinations. With the interest in commercializing these wild horses and no measures of protection, eventually the wild herds dwindled in numbers until the last wild horse was spotted in 1969. Today, all captive **Przewalski horses** descend from only 13 of the over 100 foals captured in the wild.

Figure I.37
The Takhi (*E.przewalskii*) is unlike the domestic horse (*E.caballus*) in that it has an upright mane, no forelock, short dock hair on the proximal end of the tail and a consistent "pangaré" wild hair coat pattern. Additionally, their temperament is not suited for domestication. More importantly they possess a different number of chromosomes and have no genetic maternal link to the true horse whose specific origins are much older.

The Przewalski World Wide Web Home Page states that Colonel Przewalski described the horses as being "…alert and very shy, with acute hearing, very good eyesight and a highly developed sense of smell. They seemed to prefer saline soils and could survive a long time without water." From the more than 1,500 **Przewalski horses** now in zoos and parks, a reliable species description can be made. Their size is similar to that of most wild *Equus*, varying between 12 and 14 hands. They are short-legged but thickly built with lots of substance. They have good muscle definition, solid bone and extremely strong hooves. They have a straight or slightly convex facial profile, with a flat and wide forehead, small well-spaced eyes, a well-defined muscular jaw and short attentive ears. So far, they sound an awful lot like the protagonist of this book, the **Chilean Horse** but other characteristics about them won't.

Their hair coat color is varying shades of dun that change with the seasons. All specimens have a black mane and tail, as well as a thin black dorsal stripe and most have zebra stripes on the upper legs. Like all other wild *Equus* (and unlike the feral and domestic horse), the **Przewalski horse** has a completely erect mane with no forelock. Also following the wild *Equus* pattern, they have short dock hairs near the proximal end of the tail, but a distinctly bushier tail made of longer hairs on the distal portion of the tail. Like the species in the Subgenera Asinus: *Equus asinus* (Linnaeus 1758) *and Equus africanus* (Heuglin and Fitzinger 1866), as well as the species in the Subgenera Hemionus: *Equus hemionus* (Pallas 1775) and *Equus kiang* (Moorcroft 1841) the **Przewalski horse** has a lighter colored muzzle. Like five of the other six wild *Equus* species, it also has a lighter-colored abdominal underside that along

with the lighter colored muzzle, area over the eyes, flanks and inside of the legs is part of the "pangaré" (light areas on muzzle, over eyes, flanks and inside legs) wild hair coat pattern.

It is worth mentioning that the **Przewalski** we see displayed around the world in zoos may not be an accurate representation of the horses that Colonel Przewalski first set eyes on in Mongolia. The athletic and robust products that have resulted from a century of human selection seem a far cry from the genuine animal photographed by Frederic von Falz-Fein, the first man to have a **Przewalski horse** in captivity. This classic black and white photograph depicts an equid that, without doubt, looks more like an unusual wild species of *Equus* than any domestic horse. The disproportionately large, coarse and convex head has low-set eyes and a strange, rather pointed muzzle with a very short mouth. It displays an incredibly thick throatlatch, poor muscle definition and a totally erect mane that ends behind the ears. The characteristics seen in this early photograph makes one suspect that the many muscular zoo specimens of this species with semi-erect manes that end in front of the ears, have some crossbreeding in their past. In fact, it is said that only three? of the foundation lines of the **Przewalski horse** have a pure genealogy, so many of the horses that represent the species today may have some hybridization in their background.

For a time many experts considered the **Przewalski horse** to be the direct ancestor of the modern horse with exactly the same genetic material distributed on 66 chromosomes versus the 64 that are found in all domestic horses. It has even been conjectured that the origins of the modern horse may in fact go back to the Ukraine where mutant members of the **Przewalski horse** were first domesticated and then spread throughout the human settlements of the world. The term "ancestor" may now prove highly questionable for most modern horse breeds and types as work by Jansen (Jansen, Forster, Levine, Oelke, Hurles and Olek, 2002. "Mitochondrial DNA and the Origins of the Domestic Horse") has shown that there is no maternal link between the **Przewalski horse** and the modern domestic horse genotypes studied (that is not to say other central Asian genotypes don't have such a connection) and the latter seems to have the older family tree of the two. If the tie between the two is non-existent or weak at best, it would seem that proponents of the idea that the Mongolian wild horse is a different species merit more consideration.

No doubt all *Equus* species have some common origins, but I would venture to say that given the present thinking that the *Equus simplicidens* came into being four million years ago, it is unlikely that the *Equus caballus* is the product of some "recent" mutation. In fact the mt-DNA work with only a portion of the modern horse types is showing that these genotypes date between 200,000 to 500,000 years back to a common ancestor. Moreover, there is evidence that other caballine equids species have existed that were phenotypically much more similar to the *Equus caballus* than the *Equus caballus przewals*ki or *Equus przewalskii*, however one chooses to view them. That bottom line is that the *Equus caballus* has been around longer than the **Przewalski horse** and this possibility should not surprise us in light of the fact that caballine equids have existed for one and a half million years and were present in Europe for the past 900,000 years.

Exmoors also Weathered the Storm

So we no longer should be surprised when we learn that research from The Veterinary College of Edinburgh speculates that the modern Exmoor pony is a descendant of horses that inhabited the northern latitudes around 100,000 years ago. The first studies done with mt-DNA would indicate that Exmoors are part of the C1 genotype that in fact is closer to 200,000 years old. In her book *International Encyclopedia of Horse Breeds*, Bonnie Hendricks writes that "fossils closely resembling the Exmoor structure, coat color, dentition and grazing habits were widespread one million years ago in many areas of the word." *(Hendricks, B. L., 1995, pp. 180)* This seems a very valid opinion, since "The Exmoor is the only living breed to show jaw development similar to that found in fossilized bones in North America, also showing the beginning development of a seventh molar, found in no other living breed of horse or pony" *(Hendricks, B. L., 1995, pp. 180).* The purity of the Exmoor has been maintained for modern

scientific study because of its incredible tolerance of cold environments in which crossbreds cannot survive.

Figure I.38 The Exmoor pony may be one of the oldest purebred representatives of *Equus caballus* and living proof that in many secluded parts of the world the caballine equids did not go extinct.

It seems clear to me that that the adaptability of the Exmoor is just one of many examples of equines that were not exterminated by the world crisis of 10,000 years ago. Thus far two genotypes have been identified to be present in the Nordic breeds and research seems to indicate they have been around for the past 200,000-300,000 years. When one realizes that the disappearance of most equids around the world was just 10-12,000 years ago, the exactitude of the previous figures are not necessary to make the same conclusions. It seems reasonable to think that many pockets of caballine *Equus* representatives were left around the world. To propose that the diverse genotypes with different physiological characteristics that make them better suited for a wide range of climates, all stem from a singular region of survival in northern Asia in my opinion is a naive view that does not make the most sense. Perhaps some of the evidence of the survivors has been lost under sheets of ice, others under blankets of sand and others simply in the midst of isolated areas that have not begun to be studied by paleontologists with a special interest in the plight of the horse. I don't believe we need the full chain of explanations to justify living proof that already lies before us.

Przewalski Horse and Domestic Equine: Are they One and the Same Species?

Perhaps due to being too liberal in assigning species in the past, today it seems we have a tendency to want to lump the variety that exists in the *Equus* genus into as few categories as possible. Given the fact that the cross of a **Przewalski horse** and the domestic equine result in fertile offspring, there are those who reason they should not be classified as different species. However, if one looks at the zoological classifications of animals, there are many examples of different species that result in fertile crosses.

Perhaps the most dramatic example is found in Latin America where camelids of the Andean highlands that not only make up different species, but also different genera, are capable of producing fertile hybridization. The *Lama glama L.* (the domestic llama), the *Vicugna pacos* (the domestic alpaca), the *Lama guanicoe* (the wild guanaco) and the *Vicugna vicugna* (the wild vicuña) all represent different species and two different genera that will interbreed and produce fertile hybrids. The latter two had been previously classified by some as being part of the *Lama* genus and this at the time seemed more reasonable in light of the fact that there are few intergenera crosses that consistently produce fertile offspring. However, mt-DNA and satellite Y-chromosome analysis have suggested that the alpaca actually branched off from the vicuña some 6-7,000 years ago *(Kadwell, Miranda et. al. 2001).* Since it was clearly reconfirmed that the llama is a descendent of the guanaco, it seems the common ancestor of the guanaco and vicuña existed some two million years ago. It is truly is remarkable that these independent genera that went separate ways so long ago are still able to breed and reproduce fertile offspring and that the domestic species that evolved from each, will readily do so on their own when groups of both genera are grazed in the "bofedales" of the Andean highlands.

The origins of domestic cattle also provide more examples of how common it is to consistently obtain fertile offspring when crossing different species. The European auroch (*Bos*

primigenius) is considered the earliest ancestor of domestic cattle. In fact, it is thought that all modern *Bos taurus* breeds are descendants from this species. For example, Scottish Highland cattle (*Bos taurus*) are thought to be the product of crossing two species. The auroch (*Bos primigenius*) specimens that were left stranded in the British Isles after the glacial bridges of ice receded, were crossed with the Celtic Ox (Bos longifrons) when Neolithic men introduced them to Scotland 7,000 years ago. However, the *Bos taurus* breeds were still being back-crossed with the auroch before the last representative of this ancient species died in Poland in 1627. The *Bos primigenius* X *Bos taurus* should not be viewed as an interspecific cross as it is in reality the reproduction of a wild animal with its domestic replication. Much the same can be said of the resulting crosses of *Bos primigenius* on the Zebu cattle (*Bos indicus*) that migrated from Pakistan into a secluded Alpine valley. After 25,000 years of natural selection, this gave rise to the double-muscled Piedmontese breed that takes its name from the Italian region.

The three contemporary species of domestic cattle, the *Bos taurus* (cattle of north Africa and later temperate European origins), the *Bos indicus* (cattle of tropical Indian origin) and the *Bos frontalis* (Mithan cattle), all share the same number of chromosomes, but have enough physiological differences to be classified as different species. Although each descended from the aurochs or their regional subspecies hundreds of thousands of years ago, they consistently have fertile offspring and between the first two there are many breeds such as the Santa Gertrudis, Brangus, Braford, etc. that are well known examples.

Not all fertility of hybrids is black or white, as the results can be fickle, too. When domestic cattle (*Bos taurus*) are crossed with Yaks (*Bos mutus* when wild and *Bos grunniens* in the domestic variety) or the European bison that are also known as Wisents (*Bison bonasus*), the males that are born are sterile while the females are fertile Yet, the first generation females can be crossed back to either parent species and produce fertile males and females. I hope you noticed that the Yaks are a different species from domestic cattle, but the Wisents yet are another example of intergenera crosses that are capable of fertile offspring. For that matter, the American plains (*Bison bison*) and wood buffalo (*Bison bison athabascae*) are both capable of fertile offspring with the domestic cattle and the Beefalo and Cattalo breeds are examples of this intergenera cross.

Table I.2
Number of Chromosomes in the Various Representatives of the *Equus* Genus

Genus and species	Taxonomy	Common Name	No. Chromosomes
Equus przewalskii	Poliakov 1881	Mongolian wild horse (Takhi)	66 chromosomes
Equus ferus	Boddaert 1785	Russian wild horse (Tarpan)	?? chromosomes
Equus caballus	Linnaeus 1758	Domestic horse	64 chromosomes
Equus africanus	Heuglin & Fitzinger 1866	African wild ass	62 chromosomes
Equus asinus	Linnaeus 1758	Domestic Donkey	62 chromosomes
Equus hemionus	Pallas 1775	Onager	56 chromosomes
Equus kiang	Moorcroft 1841	Kiang	52 chromosomes
Equus grevyi	Oustalet 1882	Grevy's zebra	46 chromosomes
Equus quagga	Gmelin 1788	Plains zebra	44 chromosomes
Equus zebra	Linnaeus 1758	Mountain zebra	32 chromosomes

As far back as 1758 the Swedish botanist and physician Carolus Linnaeus that laid the foundations for taxonomy informed us that dogs, wolves, jackals and coyotes could interbreed and produce fertile hybrids. This means that *Canis lupus* (gray wolf), *C. familiaris* (domestic dog), C. simensis (simian jackal), C. aureus (golden jackal), C. mesomelas (black-backed jackal), *C. adustus* (side-striped jackal), *C. latrans* (coyote) and *C. rufus* (red wolf) should all be capable of fertile hybrids. Moreover, once again there are even greater crossovers than these examples of successful interspecific reproduction. Virile offspring can also be obtained between the coyote (*Canis latrans*) and the red fox (*Vulpes vulpes*) which are not only representatives of different species, but also different genera *(Bekoff, Marc, 1977)*. Such examples are found throughout the animal kingdom as it is said that 10% of all avian species also willingly hybridize and some, like the Galapagos finches, are known to produce fertile hybrids.

So it is strange that the P**rzewalski horse** should not be considered a different species from the domestic equine. The fact that it is capable of having fertile hybrid offspring when crossed with the horse does not eliminate the possibility of it deserving a different taxonomical label. Besides, the sheer fact that it consistently has a unique number of chromosomes in the *Equus* genus should be reason enough to merit its classification as *Equus przewalski p*. as in effect some have already claimed.

There are those who maintain that the equine species shares the same genetic material in a slightly different number of chromosomes. This hardly seems to be the case, since certain characteristics of the **Przewalski**, like their distinct vocal sounds, their completely erect manes, lack of a forelock, short dock hair and distal tuft on the tail and lighter colored muzzles and bellies (known as the *pangaré* color which is controlled by a proposed dominant "P" gene that is on an independent color-related loci of wild horses) are simply not common traits of *Equus caballus*, yet they concur with the make up of other wild equid species.

Table I.3
Comparing the Domestic Horse to Wild *Equus* Species

Characteristic	Ass	Mount. Zebra	Grevy Zebra	Plains Zebra	Horse	Takhi
Taxonomical classification	E. africanus	E.burchelli	E. grevyi	E. burchelli	E. caballus	E. przewalskii
Chromosome numbers (2N)	62	32	46	44	64	66
Length of gestation (days)	365	365	409	365	336 days	330-365
Vocalization	bray	neigh	bray	bark	neigh	shrill voice
Upright mane that sheds	yes	yes	yes	yes	no	yes
Presence of a forelock	no	no	no	no	yes	no
Black rimmed ears	yes	yes	yes	yes	few	yes
Homogeneous hair coat	yes	yes	yes	yes	no	yes
Skin color	?	?	?	?	dark	dusty gray
Dorsal Stripe	yes	yes	yes	yes	few	yes
Stripes on legs	yes	yes	yes	yes	few	yes
Light under belly	yes	yes	yes	no	no	yes
Presence of slight dewlap	no	yes	no	no	no	slight
Length of vomer	?	>X	>X	>X	X	<X
Form of occiput	square	square	square	square	rounded	square
Cranial Capacity	X+	X+	X+	X+	X	X+
Length of the diastema	-X	-X	-X	X	X	- X
Curvature of molar teeth row	X+	X?	X?	X+	X	X +
Meatus acusticus projects beyond squama temporalis	?	yes	?	yes	no	yes
Metacarpal:Prox.Phalanx R.					X	>X
Metacarpal:Metatarsal ratio	+1	+1	+1	-1	-1	=1?
Presence of chestnuts	in forelegs	in forelegs	in forelegs	in forelegs	all four	?
Long thick nasal cavity	yes	yes	yes	yes	no	yes
Hooves	narrow	narrow	broad	broad	varied	+/- wide
Moulting dock of tail & mane	yes	yes	yes	yes	no	yes
Dock of tail characteristics	very short	very short	very short	very short	long	short
Over all type of tail	tufted	tufted	tufted	tufted	long	tufted[o]
Ear length	long	long	long	long	short to med.	med
High tolerance to H2O loss	yes !	yes	yes	no	no	yes!
Permanent Social Groups	no	yes	no	yes	yes	yes
Territorial	yes	yes	yes	no	no	no
Temperament	stubborn	indomitable	indomitable	indomitable	submissive	indomitable
Size (m)	1.29m	1.18-1.32m	1.40-1.50m	1.20-1.40m	1.14-1.50m*	1.22-1.32m
Size (hands)	12.2 hh	11.2-13.0 hh	13.3-14.3 hh	11.3-13.2 hh	11.1-14.3 hh	12.0-13.0 hh

** The height of the horse was stipulated as a range that was found in primitive variants and native breeds with little human intervention. Obviously specific breeds selected by man would create range that would be more in the order of 1.00-2.13m.*

[o] The Przewalski tail is tufted and although docked hairs are short and will moult there are long hairs on the lateral side of the tail similar to what is seen in the Kiang.

Still, it is interesting that only two chromosomes differentiate the **Przewalski horse** from the domestic equine (66 versus 64 chromosomes). A crucial similarity in genotype must exist between the two species when fertile offspring (with 65 chromosomes) are produced from this cross. After all, the same difference in chromosome numbers exists between the horse and the ass (64 vs. 62 chromosomes) and equally consistent production of sterile offspring (mules with 63 chromosomes) results from the cross of the *Equus caballus* and the *Equus asinus* (donkey). This evidently has to do with the ability of compatible crosses to have a similar number of

major arms and crucial DNA material during the pairing of chromosomes. It has been observed that species that differ in chromosome numbers but have similar number of major arms have a greater probability of producing fertile offspring.

This is the case of the **Przewalski horse** and the domestic equine, which have 66 and 64 chromosomes respectively, but in those chromosomes they both have 94 major chromosome arms. This is also occurs with *Equus hemionus* and *Equus asinus*, which have 56 and 62 chromosomes respectively, but both asses' posses 104 major chromosome arms (note that this fact does not deter them from being classified as two different species). In both of these examples that have a like number of major chromosome arms, the species are capable of having fertile offspring.

This same concept is probably responsible for the fertile offspring that can result from crosses between the Asiatic wild ass and the Onager. For years scientists classified these two types of *Equus* as variants of the same *Equus hemionus* species in spite of the fact that the Onagers possessed 56 chromosomes and the Kiang had only 52. Now after much deliberation in evaluating the differences in hair coat patterns, shape of the hindquarters, size of the ears AND differences in chromosome numbers, what seemed obvious from start to Moorcroft has established the Kiang as the independent species *Equus kiang* (Moorcroft 1841). Why do I get the impression that our present debate over the classification of the **Przewalski** is something that Yogi Bera would describe as "*dejà vous* all over again".

This major arms principle gave way to the theory that may have meshed any ancient *Equus sp*. with 66 chromosomes into the exception that gave way to the modern horse. If a genetic abnormality (such as centric fusion) produced the first horse with 64 chromosome horse from an earlier ancestor, this individual could have crossed with mares of this ancient species bearing 66 chromosomes and obtained fertile offspring bearing 65 chromosomes. If this original *Equus caballus* mated with its offspring, the backcross to the horse would then produce horses with 64 chromosomes and the new species would be underway. (Budiansky, S 1997. pp.57-58) The reason I propose the idea that the *Equus ferus* could have mated with an ancestor rather than the **Przewalski horse** per se, as many authors have suggested as a valid possibility, is because recent genetic work with mitochondrial DNA shows no maternal link between the *Equus przewalskii* and the *Equus caballus* specimens tested (paternal links may exist but this has yet to be shown) and in fact the origins of the *E. caballus* species precede those of the *E. przewalski p.* by an ample margin. However, I think most scientists would agree that *Equine ferus* probably had 64 chromosomes just like the domestic horse.

Figure I.39 The debate is still ongoing whether the Takhi is wild version of the true horse (*Equus caballus*) or a different species that should be referred to as *Equus przewalskii*.

The other more plausible argument that gets tossed around a lot is that many species can have a discrepancy in the number of chromosomes they use to carry the same genetic material. It is documented that Plains zebras occasionally have 45 chromosomes instead of their normal 44. Most donkeys have 62 chromosomes but at least one female ass was found to have 63. Kulans, kiangs and Persian onagers all have representatives that can have one more chromosome than is their norm. The most logical reason for these occasional abnormalities is that one chromosome breaks off in two parts and an odd number of chromosomes then carry the exact same genetic material. This time we are talking about centric fission (splitting of genetic material versus the joining of genetic material in the centric fusion we touched on above)

Therefore, having small numbers of individuals that evidence the same characteristics of the species but happen to have an additional chromosome is something that can be expected as one of idiosyncrasies of nature. However, it is hard to justify this as a probable cause in an entire regional population of a "variant" that differs not in one chromosome, but two. It would be harder yet to understand how this would explain how they possessed unique physiological

characteristics if they were supposedly dealing with the same genetic material. Yet that is exactly what some would have us believe if we accept the idea that the **Przewalski** is a subspecies of *Equus caballus*.

In order for this to explain the creation of 66 chromosomes of the **Przewalski horse** a true horse would have had to have two chromosomes split apart, or perhaps have one chromosome break into three sections. If we see so few animals in a population, evidence the split of one chromosome (through Robertsonian Polymorphism), the probability of parting two would seem infinitesimal. Additionally, this individual would have to develop into one of the dominant males that crossed with a harem of mares with 64 chromosomes. This stallion would then have to maintain his hierarchy in the herd long enough, to later breed his own 65 chromosome daughters, (something that generally tends not to happen in wild herds as they are often chased away when reaching puberty) and thus start a new generation of 66 chromosome horses. These 66 chromosome fillies would need to be bred by sons of the originally mutated stallion (when logically stallions from older generations with 64 chromosomes would have stepped into the dominant role first) in order to maintain a growing number of horses with a 66 chromosome count in the herd. That is simply too many IFs for me!

It is only a matter of time before enough evidence will arise in order for the classification of the **Przewalski horse** to receive a more unanimous backing, be it on one side of the fence or the other. Although it seems the majority of the scientific community still looks upon it as the same species as the domestic horse, there are others (in which I include myself) that find it much more logical that it should be a considered the ninth remaining species of the *Equus* genus.

Through personal communications with Hardy Oekle I recently became aware that there are some Himalayan horses with strong primitive phenotypes that have been found to have 65 chromosomes. This 1995 sighting of the Riwoqe (also spelled Riwoche) ponies was an extraordinary find of the great French adventurer Dr. Michael Peissel on his 25th trip to Tibet. This in itself is not that meaningful as there are some other ancient breeds like the **Caspian pony** that have been found to have this odd number of chromosomes as well. Yet, what makes this particularly interesting is that these Himalayan equines seem to have a very primitive outward appearance. Although the **Caspian pony** does not, their karyograms have been suggested by some researchers to be identical to the cross between *E. caballus* and *E. przewalski* and this has made researchers suspect it too could be a natural hybrid.

What makes these findings attention-grabbing is that it seems there is reason to think that both these possible hybrids do not reproduce normally. In the case of the Caspian pony it has even been given as a reason for their numbers being reduced to near extinction. If this is verified in solid research it may create a stronger position for thinking that the **Przewalski horse** is in fact a closely related, but independent, species to the *Equus caballus*. This reduced reproductive efficiency is seen in some other interspecific hybrids such as the coydog (coyote X domestic dog cross), so an absolute infertility is not required to give more credence to the idea of different species, even under the most conservative of definitions. The way I see it, fertile offspring don't necessarily rule out interspecific crosses, but when the offspring have some degree of abnormal fertility this would surely not correspond with the survival of any species and naming the participants as such is at best a questionable conclusion. Still, don't take my word for it…you draw your own conclusions!

The Wild Tarpan Horse Slipped away from Our Grasp

The other primitive wild horse that apparently still existed in historic times was the **Tarpan**. The first wild herd was identified in the country of Poland where there is still a strong interest and identity with this caballine form. It is thought that the **Tarpan** (*Equus ferus ferus*) at one time inhabited all the area between Spain and southern Russia. The last wild **Tarpan** died in a game reserve in Askania Nova in 1876. The last purebred **Tarpan** in captivity is said to have died in the Munich Zoo in 1887. However, there are various efforts trying to recreate the subspecies from a variety of domestic horses that were strongly influenced by the original **Tarpan**.

Figure I.40 No one is certain what the truly wild Tarpans looked like, but it is known that they were mousey gray grullas with semi upright manes. In various organizations around the world they have been recreated using breeds that are thought to have a strong Tarpan influence.

The Polish government has created a preserve in a forest in Bialowiesa which has permitted the natural breeding of the **Polish Primitive Horse,** which is thought to be a direct descendant of the **Tarpan**. The hopes are that through natural selection in an environment similar to the surroundings where the wild herds thrived not long ago in Poland, the **Tarpan** genes will prevail.

In 1933, the first attempted recreation of a **Tarpan** was born in the Munich Zoo in Germany. The sibling zoologists Heinz and Lutz Heck had done extensive work crossing **Polish Koniks (Bilgoraj variety)**, **Icelandic Ponie**s, **Swedish Gotlands**, **Polish Primitive Horses** and the **Przewalski Horse** in an effort to recreate the **Tarpan** horse of yesteryear. They finally came up with a composite that is now being bred amongst themselves and which many feel is very similar to the original **Tarpans**. Obviously looks aren't everything, but since the breed was exterminated the effort to duplicate it phenotypically is noteworthy nonetheless.

Some of these horses were distributed around the world to various zoos, and in the 1950's the Atlanta Zoo was the recipient of such a shipment. Unfortunately in time the zoo lost interest in the herd and eventually gave them to their record keeper a Ms. Ellen Thrall who started a North American **Tarpan** registry that I recently have seen listed for sale in online web site. The herd was taken over by Candy Vorderbrug in Wisconsin and recently she came to an agreement with the *Rare Breeds of Canadian* organization to continue with the breeding effort of this pure strain of **German Tarpans**.

Figure I.41
Tarpans from the North American Tarpan Association are being put to work. Their origins appear to trace back to the project in the Munich Zoo.

Lynda Konrad who had been working for the Rare Breeds of Canada program trying to preserve the **Canadian Rustic** pony has become the key defender of the **German Tarpan** in North America. She tracked down the aforementioned herd in finding that one of the foundation sires of the **Canadian Rustic** was a **GermanTarpan** named Leonardo that had been acquired from the Atlanta zoo herd. Now she has formed the *North American Tarpan Association* with the help of four breeders in Alberta that have taken on the responsibility of the reproducing the 28 horses that were acquired in Wisconsin. Although the geneticist Dr. Gus Cothran determined this herd has unique traits that differentiate them from the Polish Koniks, their direct lineage to the Heck brother effort in the Munich Zoo over seventy year ago makes supporting this project a praiseworthy ambition.

In France there is an organization that has worked since 1990 to reproduce the last Pyrenean **Tarpans** they could find. The criteria for choosing their foundation animals was based on a blood antigen that is associated with the original **Tarpans** of the Pyrenees, as well as a demanding phenotypical exam that covers 56 crucial characteristics. Starting with 20 mares

and 4 stallions, the herds of **Pyrenean Tarpans** are now reproducing naturally in an 8,500 ha. (20,995 acre) wooded mountain reserve.

Figure I.42 The Pyrenees Tarpan is being reconstructed by blood antigen markers and 56 crucial characteristics.

Various authors have expressed the opinion that the **Tarpan** genotype is predominant in various regional breeds from northern Portugal and Spain and southern France, such as the **Garrano** pony, the **Asturian** pony, the **Pottok**, and the **Navarre** Pony. As late as 1950, there were still many small feral herds of these breeds that were surviving in the wooded mountains of their respective regions.

Admittedly others hippologists attribute these breeds to the influence of the Celtic pony which they felt had no ties to the primitive **Tarpans**. Phenotypic characteristics and historical accounts of the region would certainly make this alternative more logical to my way of thinking. Now recent findings are making a genetic maternal connection to the **Afro-Iberian Primitive Horse** which evidently at one time must have been widely distributed throughout the Iberian Peninsula. DNA polymorphism studies published in 2006 by Vega, Calderón, Rodríguez-Gallardo, Martinez and Rico point out the **Retuerta** horses in the Doñana National Park in southern Spain failed to cluster with either of the two major clades of the eleven European and North African breeds they were compared with. It is presently considered that the **Retuerta** horses have a unique genetic make up that makes them one of the oldest equine genotypes in Europe. Until more complete genetic studies take into account the paternal contributions of the northern Iberian breeds, I find it difficult to make any reasonable conclusions. It seems the future will point out a more complex phylogenic relationship has existed in this region than once thought.

At any rate, the wooded setting does seem to be a common denominator in the recreation of the **Tarpan**. It is known that this was the type of area they inhabited in Poland where they became a menace to local farmers trying to carve out agrarian sectors on the edges of forests. It is theorized that the **Tarpan's** grulla hair coat color better adapted them to the woodland environment. This darker coloration is thought to have offered a better camouflage in the dense vegetation, as well as permitting them to dry off faster in this damp and shaded habitat. It is interesting that these grulla hair coats turn a shade of tan when the winter coat sets in, because this lighter, brownish color then blends in well with the fall colors and leafless trees.

Figure I.43 Tarpans were clearly well adapted to woodlands. During the spring and summer their grulla coloring blended in well with the shadows of the trees and when fall set in , their hair coat took on a color change that offered perfect camouflage amongst leafless winter trees.

It would seem reasonable that these changes in the phenotype of *Equus ferus* would have been selected after the end of the last Ice Age, when much of Europe was covered with dense forests. Interestingly, this climatic alteration is attributed to the near extinction of the horse in Eurasia, and yet to this day we are seeing living examples of feral horses that have adjusted well to the very environment that is blamed for their disappearance from much of the continent. Many domestic horses have also effectively adjusted to this type of terrain. I think the fact that the wild **Tarpan** endured in wooded surroundings until the late 19th Century, when the human intervention drastically reduced their numbers, is proof that that the theory of "trees taking over the prairies" is not a reasonable explanation for the disappearance and/or reduction of the *Equus* in much of the world.

It is hard to say if nowadays we have a reasonable likeness of the truly wild **Tarpan**. What was found living in the wilds of Poland in the late 1800's probably already had some crossbreeding with the domestic horse. A common complaint of farmers of the time was that the **Tarpan** stallions would steal their domestic mares from their homestead. So, what history remembers of this breed is possibly somewhat distinct from its true origins. On the other hand, there are various breeds that have been influenced by the **Tarpan**, and most of them have some similarities that one could assume come from this prehistoric species.

The Heck brothers did the most to try and determine what the original phenotype was like and the description of their genetic reconstruction of the **Tarpan** is as follows:

Their size is typical of most wild horses, standing between 13 and 13.2 hands. They have a long-nosed and a small-muzzled head with a well-defined but flat jaw, medium length ears and a straight and sometimes slightly concave head profile (it is interesting that the classic drawing of a Tarpan offered by Brehm shows an aesthetic concave profiled head). They have short backs and strong loins with a rounded rump that is not overly muscled. They are smooth-muscled with flat shoulders. They have very dense bone of medium thickness and extremely hard, dark hooves that never require shoeing.

There is a prevalence of the grulla coloring in the **Tarpan**. This smoky gray or mouse coloring comes with dark points on the head and legs. All of the Tarpans have a thin, dark dorsal stripe that goes through the center of their flaxen mane, creating a substantial portion of black hairs in the mane, much like the Norwegian Fjord horse. The manes are semi-erect, and when grown out, for the most part, they will suspend to the sides.

The **Tarpans** are extremely gentle and very intelligent, but at the same time they are self-sufficient and can become quite obstinate when forced into doing things. Unlike the **Przewalski**, they can be easily ridden, but their independence does deter them from being good equitation horses. On the other hand, they make excellent endurance horses and can compete well against breeds that are much bigger in size. They also have a natural willingness to jump, which is most likely a trait that evolved from their living in a woodland environment where they constantly had to cross over fallen obstacles.

Once again I must caution that these are generalities about the temperament of horses that are not purebred, primitive, **Tarpans** and it may be misleading to think these descriptions accurately depict the original prehistoric specimens. However, if the **Tarpan** in fact was partly responsible for various European and Middle Eastern breeds, it may very well have been a primitive horse with a privileged personality. More corroborating evidence comes from some indicators that suggest the primitive **Sorraia** (or "zebro" as it may have been called in the past) may be a variant of the **Tarpan** horse that also has a long history of a wild lifestyle and they too have been found to have a much more placid temperament (as far as wild horses go) that is much easier to subdue. On the contrary, **Przewalski horses** (many of whom were also a product of crossbreeding) have been raised in zoos in close contact with man for more than 13 generations and they continue to be an indomitable species that refuses to submit to domesticated behavior. So, even though good hard evidence showing the **Tarpan** had a complacent character does not exist, many of these anecdotal experiences permit us to make some educated guesses.

Some of the literature classifies the **Tarpan** as an independent species *Equus ferus ferus* (Hamilton Smith 1841) and others as *Equus gmelini* (Otto Antonius 1912). Other researchers are of the opinion it is a subspecies and the taxa used is *Equus caballus ferus* or *Equus caballus gmelini*. A much needed clarification came when in 2003 the International Commission on Zoological Nomenclature approved the ruling (Opinion 2027) where by all domestic species that had been classified before or contemporary with the wild species would keep their original classification and the wild species would be assigned the next available classification. In their report they specifically stipulated that the Russian wild horse or **Tarpan** would be classified as *Equus ferus* (Boddaert 1785) and the domestic counterpart would be the *Equus caballus* (Linnaeus 1758). No ruling over a debate that has lingered for more than 200 years will receive unanimous approval, but it has obtained considerable support from workers in zoology, archaeozoology, palaeontology, conservation, ecology, ethology and endangered species management.

Unfortunately, the scientific community was too late in becoming interested in the **Tarpan** and this fascinating prehistoric equine was permitted to become extinct before serious studies could be carried out. The fact is that many zoologists did not classify the **Tarpan** simply because they considered it a variant of the common horse (*Equus caballus*), while some others even questioned it ever existed. I have a hard time being that skeptical. There have been various references to the **Tarpan** over time that are, hard to ignore. In Poland they were revealed in Kaliningrad in 1814 and Bialowieza in 1820. In the Ukraine they were observed in Bobvrosk (1769), Kherson (1866) and Tavrichesk (1879).

Personally, I think that in history and religion many things lack hard evidence. Yet, when we go back far enough, anecdotal commentaries that are consistently repeated by many people over a broad area deserve our serious consideration. In Spanish there is a proverb that says "when you hear the river from afar, it's because boulders are rolling downstream". In other words, most stories that have consistently been told over time have some truth to them. We will never know what the original primitive **Tarpan** was like, but most likely if we go far enough back there is a commonality with the domestic *Equus caballus* and probably in a less direct manner also to the *Equus przewalskii*. In appreciating its genuine physiological and psychological similarities to the horse, the **Tarpan** may have been one of the last of many primitive contributors to the species mankind has grown close to in historic times.

Was it Phenotypic Variety or Artistic License?

Some authorities make mention of the similarity between the **Przewalski horse** and the French and Spanish cave paintings that date to before the horse was in danger of extinction. Other experts lay claim of a greater likeness to the wild **Tarpan**. Still others find some of these prehistoric representations to have very distinct characteristics that they claim are similar to head types and body proportions of other ancient horses like the *Equus ferus stenonius*. The fact is that the artistic efforts over a span of 20-25,000 years represent a variety of horse and pony types. Some also argue that artistic license motivated cavemen to interpret horses in unrealistic ideals that they only dreamt about.

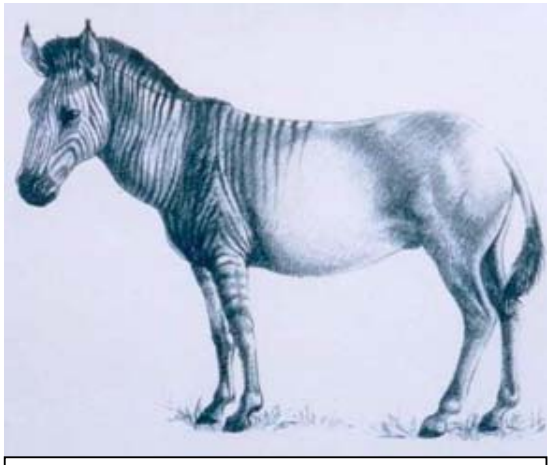


Figure I.44 Was this a subtype of the wild horse that could be termed *Equus ferus stenonius*, or was this a different more zebra like species that merits the taxa of *Equus stenonius*?

Perhaps the latter is what I have the hardest time accepting. Most primitive people drew for the very practical reason of making a likeness of something they hoped to acquire. As societies became more structured, drawings were also meant to convey a message. Either way, by coming as close to reality as possible, they better met their objectives. Whether we look at geoglyphs of llamas and jaguars in South America, paintings of bison and deer on animal hides in North America, cave paintings of auroch ox and horses in Europe or petroglyphs of Dromedary camels in the foothills of northern Turkmenistan, we can generally see an effort to depict a real likeness of the animals that shared those environments. It is difficult to accept the general assumption that convex and concave lines in animal profiles are changed due to artistic expression.

For this reason, I feel that the variety of horse conformations we see in prehistoric art are most likely indicative of the diversity of the phenotypes of the equids that were being drawn. A beautiful example of this is found in a Paleolithic rendition in the Altamira Cave in Cantabria, Spain. Superimposed on a delicate image of a typey, closed coupled, crest-necked horse with little ears and a concave face, is an image of a long-eared, short-necked ass with a flat dorsal

line. The differences in the details of these animals are as clear to the observer today, as they were to the artists that picked up on the details of the live models thousands of years ago.

An even more palpable case in point than artistic representation can be found the correlations between horses of the past and the present. When paleontologists that have studied fossil sites in southern France and northern Africa, they have noted the similarity between these ancient horses and contemporary versions of the Camargue and Barb horses that long inhabit these same areas. Still, both of these examples are debatable and express conclusions that involve some subjective appraisal. I suppose we have to ask ourselves, if the interpretation from fossils and skeletons is enough to determine that there were genetic differences that presented dissimilar phenotypic types before man had any role in manipulating herds through selection.

We surely should not be surprised that different horse types existed so long ago. We often time give too much credit to mankind in molding global horse varieties when it seems that growing evidence offers support to the idea that homogenous horse subspecies and/or variants with distinct genotypes were distributed throughout the world long before humans came on the scene. Thus far scientists have identified one genotype common to northern Africa and the Iberian Peninsula, three related genotypes in western Iberian Peninsula, two distinct genotypes in the Nordic breeds, and one from Central Asia and this has been the result of but a smithereens of tests in the presence of the nearly 400 breeds of horses that are recognized around the world. How far back should we suspect the modern horse has existed?

In 1968, in northern Siberia paleontologists studied a frozen stallion that was found to be 34,000-39,000 years old. They scientifically classified several such finds in the region as *Equus lenensis* but more commonly they became known as the **Chersky Horse**. With a muscular build on a 1.34m-1.36m (13.1-13.2 hands) frame, the frozen male corpse preserved his brown hair coat with black points and a distinct dorsal stripe. The stomach contents showed this was a horse that probably inhabited the grassy plains near wooded areas much like the Mongolian Wild Horse did long ago. Although it differed in having larger hooves, because of all the other similarities with the **Przewalski horse** there is speculation that the **Chersky Horse** could be a direct ancestor. (Olsen, S. 1996. *Horses Through Time* pp 38)

Perhaps one of the most important findings came about in 1993, when an incredibly well-preserved equid was discovered frozen in the Alaskan Yukon. Classified as *Equus lambei*, it was found to be 25,000 years old! The particularly interesting aspect of this ancient wild equid was how little it varied from feral and domestic *Equus caballus* we are familiar with today. Its chestnut hair coat and flaxen mane that lay flat over its neck was proof that species have long existed with characteristics that for years were differentiated from the truly wild specimens with atavistic traits we have been privy to in our very constricted window of time.

I suspect this would all make more sense if scientists would classify all true caballine specimens from the past as subspecies (such as *Equus ferus lambei*) rather than as independent species, so we could all get a better feel for the existence of the horse as we know it today. It seems reasonable to wonder whether the hundreds of *Equus* species over the world and the sixty found in North America alone could be reduced to an encompassing smaller number of species with sub-species, variants or races. Surely such an exercise would be valuable with the *Equus caballus/Equus ferus* so that we could have a more precise understanding of its existence over time and space. Perhaps such a comment makes the reader contemplate if there really is any reason to think *Equus caballus,* or more correctly its wild counterpart *Equus ferus,* could have existed long before man first depicted them in the rock art of caves?

I have often asked myself if more of the scientific reports should lend credibility to the variety of *Equus ferus* variants that have existed over the past millions of years. More than one study (Ishida et al 1995, Oakenfull & Ryder et al. 1998 and Jansen et. al 2002) using mitochondrial DNA suggests that the ancestors of the modern equines and the **Przewalski horse** branched apart a quarter of a million years ago. Actually one study that dates six major genotypes present in the *Equus caballus* of today indicates their origins vary from 200,000 to 500,000 years ago. Certainly, this gives us a different perspective when venturing to map out some sort of methodical distribution of modern horse types we would like to fit neatly into the two or three wild horse groups we have come to know in fairly recent history. Long before

Homo sapiens were around to document the types of fauna that attracted the hunting skills that were first put to use 55,000 short years ago, all the basic horse genotypes we know of today, and many more we still ignore, had been around for hundreds of thousands of years. If there is any consolation to our studying the Iberian Peninsula to satisfy our interest in the **Chilean Horse**, it is that two of the oldest genotypes known to man that have survived until the present time are represented in the horses of this region of the world.

Writer's Prerogative

In trying to understand the repopulation of the horse around the world, one always returns to the only wild horses man has known in the hope that we can establish a logical path of the redistribution that eventually put equines on every continent of the globe. In an effort to comprehend the origins of the modern horse, we invariably center our focus on Eurasia. Central Asia not only gave probable birth to one of the *Equus caballus* relationship with man, but it was also one of the places in the world we are certain the species subsisted when many think it disappeared everywhere else. Due to their proximity and the fact that these regions were the cradle of many civilizations; the Middle East, Europe and northern Africa invariably play important roles in the horse's expansion.

Many interesting theories exist which have caught the attention of authors. Some of these theories pass on information in the journalistic chain long enough for many readers to conclude they are now facts. This is resurging flaw in the written word to which all of us who take on the task of writing find ourselves vulnerable. It becomes too monumental of an effort to have to reaffirm the validity of everything that we read, so there is a certain amount of assumption that the known sources on the subject are providing a high level of accuracy. However, as writers there are times that we visualize different plausible explanations for the end result of a part of history that is poorly documented and it is our prerogative to expose those ideas for the consideration of our readers. Time may alter the justification for these thoughts as more information becomes available. However to dare to reason is also to accept the probability of being wrong. Only silence is a guarantee of never being mistaken. So under this premise, I would like to expand on other alternatives that may be considerations regarding the early stages of the development of the modern horse.

Climatological and Geological Changes Gives Rise to the Afro-Iberian Primitive Horse

It is always troubling to realize 20-30,000 years ago, for various reasons, the lives of prehistoric men revolved around the horse and then suddenly for a period of around 3-4,000 years there is a gap in which it is theorized the horse totally disappeared from their surroundings. It is even harder to understand when we realize that man had progressed to the point of retaining and mobilizing horses that were led with halters. Still, this seems to be the most widely accepted account of the past. Perhaps I can give a better feel for what exactly has been proposed by relaying accounts of one particular area of the world that has always had a lot of interaction between the *Homo sapiens* and the *Equus caballus*.

It is an example that takes us back to the origins of the **Chilean Horse** that we have a particular interest in studying. As we have already stipulated with detailed examples of fossils, bones and cave paintings, the Iberian Peninsula and northern Africa have had horses since prehistoric times. We have already touched on much of the evidence in Spain. The evidence in northern Africa is much more limited.

In the Constantine valley of Algeria, M. Thomas found fossils that belonged to a Quaternary horse. He noted that it was very similar to the modern **Barb** of northern Africa. Thomas felt this was a primitive horse that was native to northern Africa, with a history that is much older than the oft-cited **Arab** that is many times credited as the oldest purebred equine breed. In the same region of the Barbary Coast, Bagtache et al (1984) also describes the late Pleistocene *Equus algericus* from findings in Allobroges, Algeria.

There are researchers that speculate that the scarcity of fossil evidence in parts of northern Africa may be due to the rapid consumption of dead carcasses by scavengers. Much of

this area has been covered by the sandy advances of the Sahara Desert. Likewise, these desolate areas do not provide the natural conditions for the rock art of prehistoric man that abounds in the Iberian Peninsula. Lastly, the present-day countries of the region are less densely populated, and are not as economically endowed as Spain to unravel the many mysteries that may still linger in their midst. Perhaps these suggestions explain why there is less Paleolithic evidence of equines in the area that very well may have been habitat to one of the ancestors of the **Barb, Andalusi, Spanish Barb and Andalusian** horses in the Iberian Peninsula.

Nonetheless, history has woven an intricate relationship between the horses of the southern Iberian Peninsula and their close relatives around the Barbary Coast. This association most likely started during prehistoric times when the geological forces of the region were responsible for the genetic exchange.

What is today divided by the Straight of Gibraltar was once a united landmass that probably was home to the primitive equids that would show the way to lands that would become viable habitats for the migrating caballine representatives. There are geologists that propose that the original entrance to the Mediterranean Sea was through the valley of what is now the Guadalquivir River Basin, in southern Andalusia. At the end of the Tertiary Period, when the surrounding mountains were pushed upward by geological forces, the Straight of Gibraltar became the new low point that divided the continents with its corresponding waterway. This may have left part of the African equid population and other fauna in southern Andalusia, where they were free to propagate to new lands they were now annexed to. Other equids on the other side of the straight may have been motivated to stray farther south into the savannahs of Africa where they developed into the striped Equus we know today. At any rate, the new gateway to the Mediterranean surely did not initially have the depth and width that it has today.

Other professionals have theorized that the channel was more likely to have been the product of previous Ice Ages that reached down into the Iberian Peninsula when the land masses of the Iberian Peninsula and Africa were connected, causing them to be separated by a smaller more traversable body of water. We know that in a the last four Ice Ages glacial conditions did affect the altitudes of the Sierra Nevada in southern Iberia and the Atlas Mountains in northern Africa, and it may be that the receding ice and snow from these areas during interglacial periods could have carved out a path to the Atlantic Ocean. All this is speculation, but there is good reason to think it possible as during the last three Ice Ages the ocean levels were lowered by at least 100m (325 ft.). This was enough to create a land bridge in the Bering Straight and the same reasons would have given rise to a more transitable crossing between Iberia and Africa. So, for one of various reasons it could be conjectured that a prehistoric **Afro-Iberian Primitive Horse** became the bi-continental equid that shared both sides of the Straight of Gibraltar.

It may be irrelevant whether the viable intercontinental passage between the Iberian Peninsula and northern Africa is best explained by the theory of shifting geological contours in southern Iberia, or exposure of land bridges when oceanic water levels diminished during the Ice Age. In fact, both possibilities may have occurred at different times. The important point is that it would seem very probable that any transit between the continents would have facilitated the conveyance of similar gene pools to both southern Iberia and northern Africa.

If it then stands to reason that this genotype should be the oldest known in that part of the world, then the protagonist would be the **Afro-Iberian Primitive Horse**. Actually the **Afro-Iberian Primitive Horse** can lay claim to more than that, as thus far it has been shown to be the oldest genotype associated with the modern horse, period. Fortunately, the representatives of this lineage were positioned in the southernmost latitudes penetrated by the *Equus ferus* species. This was a cozy little corner between the immense Sahara (an area nearly twice as large as it is today) and frozen ice fields. The temperate Mediterranean climate that distanced the **Afro-Iberian Primitive Horse** from the primary areas affected by the peak of the Riss and Wiurm Ice Ages, was the main reason this horse has been able to claim its antiquity. Moreover, the cool glacial airs led to extremely dry conditions and a huge desert with less than 2% vegetative cover that extended half way down the African continent. The only place in Eastern Europe that had comfortable conditions that were found between the two extremes was the Barbary Coast and the Iberia Peninsula. So although it seems ironic, being the furthest horse from the American entree way to Asia was the saving grace of the **Afro-Iberian Primitive Horse**.

In the northern part of the peninsula, horses that had migrated southward from other parts of Europe were also an important part of the natural fauna. Caverns from all around the Iberian Peninsula and southern France depicted a variety of equines that were probably hunted and crudely domesticated by the humans of the time. The last Ice Age did not hamper the living conditions for the Iberian equids, as glacial ice only affected the higher altitudes of the Pyrenees and Sierra Nevada mountains. When a period of global warming first imposed higher temperatures in the interglacial period, the equine population of Iberia still thrived, as did the men that had interest in them.

Likewise, the fact that the caves in the north had many concave-profiled ponies painted on their walls that look much like the present-day **Garrano** pony seems much more than a strange twist of fate. On the other contrary, caves in southern Iberia that have substantial signs of a great number of sub-convex facial profiled horses with body proportions that are similar to the **Sorraia** (*Equus ferus stenonius*) would seem also more than chance coincidence. How they compared to the **Afro-Iberian Primitive Horse** is difficult to say as this genotype is only assigned phenotypic traits after receiving a strong influence from man. The emergence of the **Retuerta** horses from the marshes of the Guadalquivir River in Huelva as one of the oldest genotypes of Europe and Northern Africa offers a new piece to this puzzle. Ancient societies intervened both by introducing new variants of the *Equus caballus* while simultaneously applying sufficient selection pressures to lose any homogenous primitive hair coat color that probably existed. A point in case can be seen in the approximately 100 remaining specimens of the **Retuerta** horses that are predominately brown in hair coat color. I am unaware of a time in recorded history when we can say with certainty that the people of northern Africa and southern Iberia were not part of a horse culture and that simple observation might hint to a vivid past which provided the caballine horses some of their earliest opportunities to interact with man.

One of Various Primitive Horses that Survived Extinction

All these interesting occurrences in the past would be of no relevance, IF *Equus caballus* had disappeared from most of the places it inhabited around 10,000 years ago. That is certainly the assumption that has been made for the majority of the places in the world where *Equus caballus* existed, and most conjecture that this was the case in Iberia as well. Under that assumption, any horses that presently exist in the Iberian Peninsula would have no direct relationship with the equines prehistoric men painted on the numerous caves around the peninsula.

At the risk of sounding antiquated in the presence of the popular view of the scientific community at large, I would like to say that disregarding these multiple coincidences leaves a bad taste in my mouth. To start with, the land bordering the channel offered a beneficial climate in the midst of both the glacial and inter-glacial periods. More importantly, it needs to be said that whatever caused the extermination of equids in the Americas must not have had an equal affect in Eurasia and Africa. If equids survived in eastern Europe, central and northern Asia and throughout sub-Saharan Africa, I don't know why the idea that they might have endured in the Iberian Peninsula is so readily discarded.

During the historic years of man's existence there have been few species, subspecies or variants of caballine *Equus* that have been found exhibiting the ancestral characteristics thought to be associated with the pre-domesticated horse. Hippologists have no unified accord regarding this subject, but the **Camargue**, **Exmoor pony**, **Norwegian Fiord, Przewalski horse**, **Retuerta**, **Riwoqe-Pferd**, **Sorraia** and **Tarpan** would all be valid candidates for discussion. Still, the fact that these candidates are distributed throughout different regions of Eurasia makes me more suspect of the oft-repeated conclusion that the *Equus* dwindled to such low numbers and in a confined habitat in the world. The scant fossil and skeletal evidence no doubt indicates a decline in overall numbers. However, if small herds remained in isolated sectors of the world, while environmental conditions curtailed their propagation, finding remains of such a marginal population may be likened to finding a needle in a haystack. For this reason, we should not eliminate the possibility that remnants of the horse survived in numerous places around the world (I am not at all familiar with southeastern Asia but that surely would be another area to

seriously consider) where their exceptional adaptability and/or the microclimates and isolated surroundings permitted their continued existence. In fact, this could explain why the phenotypes depicted in caves or in the anatomy reconstructed from bones have had great similarities with the types of horses from those regions, in spite of the fact that man domesticated them long after the world crisis that is thought to have extinguished them from these areas.

Various authors have proposed the possibility that small herds of the original *Equus ferus* survived on the Iberian Peninsula, as they very well might have in other parts of the world as well. I must also admit that these conjectures have never been taken very seriously by the scientific community. Still, that is not reason enough to discard reevaluation, as in different times in history scientists have also told us the earth was the center of the universe, an unimaginable abyss was found at the ends of the ocean, the Caribbean was the western end of the Asian continent and for years California was even mapped as a large island in the Pacific.

If the Iberian equines dwindled to insignificant numbers, the lack of paleontological findings may be justifiable. If live horse types, like the **Nangchen-Pferd** that are moving about the Himalayas in their daily chores, have only recently been discovered, how many undiscovered horse groups are awaiting discovery below ground, inside eternal ice fields, below glaciers, in unearthed caves or underneath sand dunes that have yet to be swept away? Prior to finding the herds of **Przewalski horses** in Mongolia, science had not come across bony remains that indicated the survival of the *Equus przewalskii* either. The proof of their existence was so long in coming because this ancient equid had established their residence in an isolated sector of the world where the networks of modern man still had not penetrated. So, surely it is possible that when environmental conditions improved, the small herds of remaining autochthonous horses in Iberia and northern Africa also may have flourished while going unnoticed in limited worldly accounts of the time. The difference in Iberia (and in various other regions where continued existence of the equine may not be credited) was that here primeval societies were formed with close ties to the horse well before historical records were kept.

Iberian Man Shares His World with the Horse

Equine relationships with man appeared early on in history, not only on the Iberian Peninsula, but also in Mount Altai, the Gobi Desert, between the Black Sea and the Mediterranean, around the edge of the Caspian Sea, in the area around Balkach and Baikal Lakes, in the Tigris and Euphrates River basin near the Persian Gulf, in the northern marshlands and southern alpine mountains of Germany and in the Constantine Valley in Algeria. Certainly, if one assumes that the sole survivors of *Equus ferus* were stranded in Eastern Europe and Western Asia, then it would seem logical that man's earliest interaction with horses should have taken place there and then rippled out to the rest of the world.

In his book *The Nature of Horses*, Stephen Budiansky expresses the opinion that precisely this was the case and that domestication probably occurred around 6,000 years ago in part of what is now the Ukraine. However, there is a possibility that horses were domesticated on the Iberian Peninsula around the same time that equids were being used by men in Dereivka, between the Dnepr River and the Black Sea. Interestingly, in both sectors the horse was first used as a ridden mode of transport.

Possibly a third group can lay claim to early domestication of the horse. About the same time the Indo-European invaders known as the Red Earth People took over a steppe region of southern Russia and western Asia. They conquered a semi-nomadic people that already had domesticated the dog, the reindeer and the onager ass. Soon, the Red Earth people were utilizing tamed horses in their religious ceremonies. Through contacts with the tribes in the Fertile Crescent they became aware of other people that had domesticated sheep, cattle and onagers, using the latter and oxen to pull carts. It was not long before the Red Earth People were also using the wheel and offered the horse the first opportunity to provide draft power.

Still, the advanced concepts of horsemanship in the history of the Iberian Peninsula could make this one of the more viable areas of unrecorded usage of the horse. Dr. Ruy d'Andrade felt like the horse was first domesticated in the Iberian Peninsula some 27,000 years ago because of

the discovery of bone artifacts dating back that far that are exactly like those still used today for making rope out of horsehair. Of course, just because horsehair rope was made, it doesn't necessarily mean that it was used in handling horses. If there was proof that the horsehair was taken from live contained animals, rather than wild specimens that were hunted for meat that would be another matter. At any rate, Dr. d'Andrade was not alone in his thinking. Another scholar by the name of Paul Bahn also felt horses from the Iberian Peninsula could have been domesticated 20,000 years ago by the same bands and tribes of people that were responsible for the Paleolithic art in the caves of this region.

Moreover, around Dordogne, in southern France, horse paintings show Magdalenian horses using a rope halter some 15,000 years ago. Six thousand years ago, already a group of western Iberian horseman known as Cynetes, were conquering tribes from what is now Portugal and northern Spain because of the advantages they obtained in riding war horses into their confrontations. The Gymnetes were another similar ancient tribe in northeastern Spain that was also known to be excellent mounted warriors. Cave paintings dating back 5,000 years that were found at Canforos de Pearubia in northeastern Spain, confirm the close relationship between horse and men of the region, by depicting Mesolithic horses being led by men.

Obviously, much of the early domestication process may not be documented. Pin-pointing areas that have had a more progressive development of horsemanship could indicate a longer undocumented past with this domesticated animal. A key piece of evidence came about in the discovery of the halberd weapon in the western Iberian Peninsula. This is a long lance with a flint piece on the end that was used to hook and slash the tendons of passing horses. It was also used by foot soldiers to unseat mounted warriors. This find, along with other contemporary monuments, were found to be 6,000 years old. Lances with counter-weights that permitted them to be handled with the free hand of a mounted soldier were also found and estimated at between 5,000-6,000 years of age.

Around more or less the same time, drawings were made in the Towers of Bredos of Galicia that also provide prehistoric illustrations of men astride horses. David W. Anthony's chapter in *Horses Through Time* (pp. 70) informs us that H.P. Uerpmann did extensive studies of Copper Age horses in the Iberian Peninsula. He theorizes that the smaller and more variable horses that were found in the Bell Beaker culture, some 4500-5000 years B.P., are indication of having domesticated horses that previously were part of the more homogeneous wild populations of the area. N. Benecke came to identical conclusions for small societies, even further back in time. So all this gives more credence to the idea that the Bell Beaker (Vaso Campaniforme) people that began in the Iberian Peninsula 5,000 years ago owed their success in Iberia and later their expansion to Europe to their skilled warfare on horseback. As a result, it is theorized that Neolithic horsemen were actively combating over much of the peninsula. If this supposition is correct, refined domestication in the form of training horses to ride must have occurred much earlier.

Northern Africa's history has always been closely linked with the Iberian Peninsula, and therein evidence is also found of very early and advanced concepts of horsemanship. When the Iberians migrated from Africa into the southern Iberian Peninsula 3,200 years ago, they were already using metal bits with bar, snaffle and curb configurations to control their horses. Chain chinstraps were also a part of their equipment, as were the serrated metal bosals, which were called "serretas". These are still a part of horse training equipment in Spain today. Spanish archaeologists have found proof that spurs were also in use some 3,000 years ago. A discovery made by the Marquis de Cerralbo in Anguita, Spain provided evidence that the Iberians began using horseshoes between 1,200 and 1,300 years ago.

Such paraphernalia were unknown in the prestigious Greek and Roman empires of the time, which were midway between the Iberian Peninsula and the sites of early domestication of the horse in eastern Europe. It seems significant that this part of the world was at the forefront of the majority of the innovations that helped make the most use of domesticated equines. One cannot deny that the south of the Iberian Peninsula benefited from being such a rich source of metals, and that as these resources were put to use, a wide variety of equine equipment was made available to horsemen of the day. Still, natural assets such as these were also found elsewhere, near other lands of early equine domestication.

If the theory that the Iberian Peninsula is one of the original sites of equine domestication is correct, this could lead one to think that the horse had been a part of this region for as long as they had also existed in the steppes of the Ukraine and Mongolia. The fact that this peninsular sector was the forerunner of so many aspects of horsemanship while being located in Western Europe furthest from the surviving wild horse herds of Central Asia, gives credence to the thought that small herds of native horses also persisted in this region.

Pursuing this idea further, it is possible that the cave paintings from the Paleolithic Age could indicate that around 25,000-30,000 years ago, the peninsula had a variety of primitive horses present either from different genotypic origins or perhaps even the same one but with variants that found themselves better suited to the climatological and topographical difference between different regions. If the contemporary horses of the Iberian Peninsula descend from primitive herds, it is logical that the cave paintings of the prehistoric specimens coincide with the dun and grulla hair coat color often associated in wild horses. Under this supposition, the coincidence would then be that the first horses introduced by man to the peninsula would happen to be the straight/concave-facial profiled **Celtic ponies** in the north, and the straight/sub-convex-profiled **Dongola-Barb** horses in the south. The introduction of these horse races with somewhat different genotypes, added to the fact that the selection for new generations was now controlled by man, probably led to an exaggerated difference between modern peninsular breeds from northern and southern Iberia. Certainly more so than the differences in the variants of the **Afro-Iberian Primitive Horse** that once roamed most of the Peninsula.

The Enigma of the Sorraia

Where the **Sorraia** horse fits into the history of the Iberian Peninsula is an enigma. For years it made perfect sense that it was the primitive ancestor of the domestic horses used on both sides of the Straight of Gibraltar. Recent genetic research (Jansen et. al. 2002) has made it clear that at least via maternal relationships the **Sorraia** is a completely independent genotype from the **Afro-Iberian Primitive Horse**. While this served to corroborate Dr. Ruy d'Andrade's claims that this was truly an archaic horse, it also muddled the picture by not ascertaining that he had discovered the ancestor of the **Andalusian** (PRE) and **Barb** breeds.

What adds to the mystery is the observation that there is an uncanny similarity between the **Sorraia** and what we think the primitive **Tarpan** used to look and act like. Dr. d'Andrade's first encounter with the **Sorraia** was in their natural habitat and it is certain that the group of horses he observed demonstrated wild behavior. Unfortunately, due to the circumstances capturing any specimens was out of the question. As a result, Dr. d'Andrade had to content himself with starting a herd from privately owned, confined horses from that very same region. Luckily, he was able to find individuals that evidenced the phenotypical characteristics he observed in the primitive specimens that were running free. So, how accurate our assessment of the **Sorraia** temperament is, once again is a subjective matter. As the numbers grow and we become more familiar with this variant, the observations make one suspect that they not only share a similar appearance to the **Tarpan,** but also an analogous personality.

Figure I.45
Although early reports of the wild Sorraia indicate it had abundant stripping patterns, the modern representatives have the normal amount seen in any grulla

Nonetheless, much like the compliant character of **Tarpan**, it is known that the **Sorraia´s** use as a reliable mount can be limited by its independent personality that, above all, nature had

selected for survival in the wild. Possibly another likeness is that the **Sorraia** is very comfortable in wooded surroundings and like so many wild equines its survival depended on staying near thick forested areas. Its choice of habitat does not seem to be the barren desert plains or the sandy hot marshlands of the river deltas. This is not only a preference that was noticed in its wild state in 1920 but it is also one that is still prevalent today when put in ambient conditions that permit it to choose its environments. Moreover, its dun and grulla hair coat color would also indicate that this was the objective of its natural selection over time. Such tendencies may reflect that its ancestors lie to the north of the Pyrenees rather than the south of the Strait of Gibraltar. Perhaps the **Sorraia** is a remaining isolated variant of the **Tarpan** horse which at one time populated territories from Russia all the way to Spain

Although people from Portugal inform us that the **Sorraia** has had some use as a mount for cattlemen of the region, it is probable that it continued as a wild primitive horse for as long as it did because it was not the best choice for this discipline. While it seems probable that a portion of the **Sorraia** genes have been introduced into the **Lusitano** breed, the greatest influence in the Spanish horse seems to be the D1 genotype of the **Afro-Iberian Primitive Horse**. Why has this horse been the predominant contributor to the saddle horses of the Iberian Peninsula?

For one, this primitive horse has been around a lot longer than the **Sorraia**. On the other hand, the natural habitat of the **Afro-Iberian Primitive Horse** has been closer linked to the development of human settlements in both northern Africa and the Mediterranean coastline of the Iberian Peninsula. At the same time the coastal proximity of these societies gave them early contact with other human establishments around the Mediterranean, and this exchange helped them develop precocious horsemanship skills. Additionally, the flatter more exposed terrain of the Barbary Coast and the southern Iberian Peninsula provided more incentives for these itinerant people to domesticate the horse for more practical reasons than satisfying their caloric needs. These were people that never totally abandoned their hunting skills to devote themselves exclusively to agrarian tasks of sedentary subsistence. One could just as readily ask why they not preferred their saluki dogs roasting over a pit or their falcons in making a tasty soup. It seems these species were more important as hunting tools.

Figure I.46 A young Sorraia stallion that is now a product of human selection after untold time of natural selection.

The obvious mobility that was offered for hunting, warfare and transport in these wide expanses of arid lands may have made the Berbers and Iberians consider the domestication of the horse for riding much sooner than other places in the world where the necessities of life were closer at hand. Much like the Bedouins of the Arabian Peninsula never looked upon the horse as prey but rather quickly established personalized relationships that incorporated them into the family circle, it may be misleading to conclude that in all parts of the world domestication had to follow the long history of hunting and consumption that have been the case in point under some environments. If this chain of events did not take place, or even if it did for much shorter periods of times, the archaeological data of bone inventories in and around human settlements may be a misleading manner of judging man's interaction with the horse. The fact that these Afro-Iberian cultures were such consummate horsemen would also lead one to suspect that these aptitudes were a result of a different type of relationship than was seen throughout Eurasia.

So if the coastal societies progressed more rapidly than the isolated populations inland in the Iberian Peninsula, then it stands to reason that a preference would exist for the use of the **Afro-Iberian Primitive Horse** that would have more quickly obtained the aptitudes that made horses a suitable means of transportation. Given the fact that these horses probably helped

expand the Iberian realm throughout the peninsula, it is unlikely that these horsemen would look to other options in primitive horse herds that were much more self sufficient in areas of abundant rainfall and foliage.

This might explain how an isolated genotype like the **Sorraia** was left largely untouched to persist in the mountains and valleys that permitted its continuance as a primitive horse until the 20th century. Their existence is carved into history by names of valleys that refer to them. The staunch supporter of the primitive **Sorraia**, Hardy Oelke, author of the intriguing book *Born Survivors on the Eve of Extinction*, informs us that parts of southern Portugal are named "Vale de Zebra". This Portuguese expression means "Wild Horse Valley" since a wild horse in Portuguese is referred to as a zebro o zebra. These largely grulla and dun horses evidently not only had the characteristic dorsal stripe but they also had stripes on the shoulder, forearms, neck and face. So, Mr. Oelke points out that when the Portuguese explored Africa in 1450 it was quite normal that they identify the even more distinctly striped equids of that continent as "zebras". It's particularly interesting that when Dr. Ruy d'Andrade went on his hunting trip in 1920 that he saw a good number of **Sorraias** with "superabundant stripes".

In spite of the fact the **Sorraia** did not make as much of an impact on the riding horse of the Iberian Peninsula as the **Afro-Iberian Primitive Horse** did, I have touched a good deal on this horse variant because it seems certain that part of the genes that made it to the Americas contained the Sorraia's A1 and A3 genotypes. Mr. Oelke looked at genotypes of **Kiger, Sulfur, Pryor and Spanish Mustang Registry (SMR) mustangs** in the USA and it seems a small portion of the SMR traced to the unique A1 **Sorraia** maternal lineage and a good many Kiger mustangs had the A3 genotype also found in **Sorraia**-related **Lusitanos**. As one would suspect, the great majority of the horses from these feral herds traced to the **Afro-Iberian Primitive Horse** that the investigators term D1 Iberian/Barb genotype. In learning of the isolated genotype of the **Chilean Horse**, Mr. Oelke kindly ran sample on a batch of hair samples that were sent to him from purebred horses in central Chile. It is not surprising that the results also showed a strong influence of the **Afro-Iberian Primitive Horse** genes that dominated the Iberian horse types at the time of the conquest.

Mr. Oelke continues to finance phylogenic work with a continually wider spectrum of horses hoping to find as many genotypes as possible while establishing the relationships between them as well as to the common ancestor in their past. Every new outcome is a piece of the puzzle that we need to pay close attention to and Mr. Oelke is certainly one of those generous persons that is willing to unselfishly share his knowledge, experience and results with whoever shows serious interest in his projects. I truly think the horse industry is greatly indebted to the time, money and energy that Hardy Oelke has deposited trying to answer crucial questions about the genealogical tree of the *Equus caballus*.

The Afro-Iberian Primitive Horse Starts a Notable Family Tree

Figure I.47 Nubian horses of small stature were depicted in Egyptian reliefs.

Everything seems to indicate that the **Afro-Iberian Primitive Horse** was a part of the occidental region of the Mediterranean for the past half of a million years. Remarkably, since prehistoric time the **Afro-Iberian Primitive Horse** and their successors have had one thing in common and this is their refined legs. The paleontological evidence of the autochthonous horses of the region indicates the ancient **Afro-Iberian Primitives** were small in stature but with fine boned extremities that were indicative of their swiftness. Nothing assures us of the height of the aboriginal specimens that were first ridden by man, but by the time the Lybian/Numidian horse was characterized in Egyptian reliefs at Karnac 3,000 yrs. B.C. its was clear that its height coincided with that of many wild members of the *Equus* genera in arid regions, (12-13 hands). Many works of art that show men leading the horses of the time give

clear evidence to the small size of the Numidian horses that were first utilized by more sophisticated civilizations.

They continued to be an insignificant looking but speedy horse up until 1200 yrs. B.C. when the Phoenicians dominated the Mediterranean Sea. Under the Carthaginian rule that commenced in 814 B.C., it is thought the Numidian horses were especially improved. Exchanges with other Phoenician cities that were established in the Iberian Peninsula as early as 1100 B.C. gave rise to imports of somewhat larger horse variants of similar origin. However, we should not be fooled into thinking the Iberian horses of the time, were that much taller. The difference of the similar gene pools found on both sides of the Straight of Gibraltar was simply what could be justified by the more abundant vegetation in the Iberian Peninsula. Most likely, until this time the **Afro-Iberian Primitive Horse** genotype was still relatively small in stature throughout Iberia and the Barbary Coast.

More significant changes in southern Iberia and northern Africa would come as a result of stallions from a distant origin that would influence Berber and Iberian horses. When the Syrian empire expands to the borders of Egypt, North African horses would receive a tremendous boost in quality. These horses had their origins in the hands of the Arian Hittites who had taken over Anatolia (Turkey). The Hittites had exchanges with the Mitannis who had formed a strong kingdom in Syria where they used small horses from central Asia. While the Hittites benefited from putting into practice the horsemanship principles of the Mitanni with their noteworthy *Equus ferus ferus* type (**Tarpan**) horses, these exceptional mounts would in turn have a strong impact in Syria as well, creating a heterozygous cross of unusual height for the time.

Figure I.48 King Ashurbanipal of Assyria (668-626 B.C.) astride one of his fine horses during a hunt. This taller and stronger horse would be representative of the Mid Eastern horses that were part of the first wave of horses taken to northern Africa

For nearly a century long presence between 722 and 625 B.C. the tall Syrian **Dongola** horse would make its presence felt throughout the equine inventory in the neighboring territories. In fact, this would be a second wave of Syrian influence in Africa as when the Phoenicians first started becoming interested in Libya, merchants took Syrian horses to the region in an effort to improve the native breds. This time however, these fine boned and more refined horses of Turkish origins introduced a height that oscillated between 1.50 and 1.55 (15.0- 15.2 hands). Like the **Afro-Iberian Primitive Horses** they had long thin cannon bones, but additionally they offered naturally arched necks, longer legs and a natural predisposition to collect when in movement. The characteristic semi-convex facial profiles, elongated nose and medium to large ears would become traits that would come to symbolize more recent Afro-Iberian breeds that in the past have felt the **Dongola** influence. When the **Dongola** was crossed

with the **Numidian** horse the resulting equines had an ideal height of between 1.40m and 1.45 (13.3 and 14.1 hands).

The bigger scope of horses that started to infiltrate the mounts of northern Africa and southern Iberia could still not hide the lack of refinement of their origins. Various authors at the beginning of the 20th century, make mention that the ancestral horse in early African history was nothing special to look at. Evidently its principal virtues were related to its speed and the docile temperament that had made domestication of this prehistoric horse variant more viable. The Carthaginian poet Nemesis described the descendents of the **Afro-Iberian Primitive Horse** three centuries before the birth of Christ when much improvement had already taken place. The Numidian horses, he stated, were "unrefined horses with pot bellies, ugly heads and a long thick mane, but they were blessed with speed, a docile temperament which made them easy to handle and a vigor that was maintained well up in age" *(Prado, Uldaricio, 1914).* The latter quality would eventually give birth to the adage that the "barb ceases to exist, but never ages".

The Numidian branch of the Libyan race is said to have had a strong influence in the Berber people that established frugal lives further inland as nomadic tribes living in the deserts where their admirable riding skills of both horses, asses and camels were put to use. On the other side of the Straight of Gibraltar the Iberian people would be perfecting their own horsemanship prowess with a somewhat different technique. However, the Iberian people were astride an improved **Afro-Iberian Primitive Horse** (I will refer to these as **Southern Peninsular Horses** for the purpose of distinction) of their own that benefited from more fertile lands that provided a richer nutritional foundation.

The **Southern Peninsular Horse** received even more emphasis in speed when the Roman Empire would help create a more organized horse production with a clear objective of marketing the sport horses for the Roman circuses. Later, with the entrance of the Alans in 270 A.D. who were in turn followed by the Suevi and Vandals over the next 143 years, more power would be added to the list of attributes of the **Southern Peninsula Horse**. These nomadic and ruthless horsemen brought with them horse genotypes from northern Europe that would leave the greatest impact in northern Iberia and slowly have less importance as they moved southward where a larger more appealing horse already existed. A large wave of Vandals, along with some Suevi and Alans that joined them, ransacked Bética for three years before being ousted to northern Africa by the saving grace of the more sedentary Visigoths in 416 A.D. The Vandals, Suevies and Alans would join forces with some exiled Roman legionnaires as they confronted Berbers in route to the conquest of Byzantine controlled Carthage in 428 A.D. The Vandals established themselves in this city while the Alans and Suevi would push forward to take over Numidia until the Byzantine Empire would lay claim to all the Barbary Coast in 548 A.D.

The importance of this aforementioned chain of events is that when the Vandals, Suevi and Alans were ousted from Bética they took 3,000 **Bétican** (**Southern Peninsular Horses**) horses with them. During the 132 years they ruled Northern Africa surely some of the northern European bloodlines and much of the Bétican lineage had a strong influence in the **Dongola/Barb**. On the other hand, the 165 year presence of the Byzantine rulers in northern Africa and the 50 year occupation of southern Iberia would also add the impact of **Turkish**, **Syrian** and **Persian horses** by a seafaring people that had a long history of transporting horses all around the Mediterranean.

Nevertheless, as had occurred in the past, the genetic exchanges between the cultures of northern Africa and southern Iberia would continue offering outcrosses that created more heterozygosity in the ancient **Barb** and ancient **Southern Peninsular Horse**, both differing strains from the same original genotype. Each in some way has been affected by 1) prehistoric interaction between the horses of the southern Iberian Peninsula and northern Africa; as well as the 2) historic, direct and indirect, influence of the different equine genotypes from outside the region; and the 3) historic interaction of horses from the Iberian Peninsula and the Barbary Coast. Each of these points are possible ways in which the degree of genetic variety was increased. The result would be a continually improving horse type with resounding vigor, hardiness, trainability and sustainable speed. As this text will inform in the pages to come, the genetic exchanges of these two types of horses did not end here, as they would continue to have

a synergistic effect on both sides of the Strait of Gibraltar up until the formation of the Kingdom of Spain.

The Syrian **Dongola** sires would help establish the **Dongola/Barb in** northern Africa and an even taller more refined ancient **Southern Peninsular Horse** on the other side of the straight. With time the Berbers would be even prouder of their **improved Barb** that was a product of their sixty year war with the Arabian Empire, while the Moorish takeover of the Iberian Peninsula brought international fame to the **Andalusi**. The victory cries of the forces of the reconquest in 1492 would give way to the **Spanish Barb** and the true Iberian gem would come about when the Royal Breeding Stud Farm in Cordova would orchestrate the first formally registered **Purebred Spanish Horse** (Pura Raza Española or P.R.E.) breed that in English we misname **Andalusian**. The phenotypic changes and prevalence for dark domestic colors (until King Phillips II's program in Cordoba opted for a preference of noble grays) that accompanied the dependable and trainable temperament of all these horse variants and breeds were certain indicators of the close ties this D1 genotype has had with man over the past 6,000 or more years. All the aforementioned breeds and types were carriers of a common maternal genotype that has been found to be the oldest known thus far in mt-DNA studies.

In the minuscule capsule of time in which man has recorded history, humans have certainly had some role in distributing horse population. Many theories revolve around the **Tarpan** and **Przewalski horse** descendents and how they moved in an orderly and predictable fashion across the northern and southern latitudes away from their sites of origin. It seems the influence of the **Przewalski horse** has grossly been overrated in the Middle East and Europe. The **Tarpan** seems more likely to have influenced some modern breeds but perhaps it too has been given credit for more than it really accomplished.

Aside from the obvious breed characteristics of the **Przewalski,** which don't appear in any of our western European or American domestic breeds, as a horseman what is a significant difference to me is the fact that the **Przewalski horse** also has an indomitable character. Since the origin of all animals at some point in time, was a wild ancestor, it would seem that characteristics of temperament would be a very important criteria to determine the domestic ability of a species. We have already discussed how this trait played an important role in the domestication of the **Afro-Iberian Primitive Horse.** This small and docile horse in a barren land that lacked more than it offered, became the primitive horse of choice for men desirous of harvesting horse power rather than consuming horsemeat All the evidence about the **Tarpan** horse would indicate that it too possessed a much more amicable character which would have made this the wild subspecies of choice in Eurasia over the much touted **Przewalski**.

When one studies the intermixing of human societies in the basic centers of sedentary, agrarian lifestyles along with the accompanying aggressiveness which often justify their pursuit of foreign sources of security, it becomes very hard to justify neat distribution patterns of any particular genotype. It's tempting to credit man's intercommunication amongst trade routes that actually existed in about every direction. In the end, it becomes hard for man to compete with the influence of primitive genotypes that were established in regions long before man exercised any influence in them. The D1 genotype is living proof, as being the oldest genome within the domestic breeds we know about at the moment. This would seem to make it more prone to possible influences by man. In fact, we do see striking differences between the representatives in northern Iberian Peninsula, southern Iberian Peninsula and northern Africa, but in the end all these influences were unable to change the classification that is deeply rooted in the **Afro-Iberian Primitive Horse** foundation that is common to them all.

Understanding the Limitations of Mitochondrial DNA Analysis

This leads me into assuring the reader to understand that the mitochondrial (found only on the X or feminine chromosome) DNA analysis is only a tracer of the maternal lines and we should not hasten to think that horse types outside of the established genotypes that are being discovered, play no part in the horse breeds and variants we see around the world. I have already clarified that the **Przewalski horse** has not been found to have any connection via mt-DNA with horses in the lands that are west of Mongolia. As in most cultures that live in contact

with wild horse herds some male influence from wild bands of horses can be felt by domestic horse breeders who purposely expose their mares to wild stallions or whose mares are the unplanned conquest of a wild stallion's own pursuits. Furthermore, many cultures only rode stallions into battle and thus the influence of the horses from conquering nations was more apt to be felt on the paternal side. The fact is that many of the domestic horses of central Asia have a notable similarity to the **Przewalski** and these genes may have worked their way into heterozygous crosses with other baseline maternal genotypes that will probably be classified in the future.

In keeping with our example, this paternal influence could have given way to a "new" *Equus caballus przewalski* subtype, rather than what I consider was the "true" *Equus przewalskii,* which is the unique equid species with 66 chromosomes that roamed the isolated savannahs that bordered the Gobi Desert. Unfortunately, whatever influence this new **Przewalski** had on the domestic horse breeds and types will not be picked up by mitochondrial DNA analysis since this method links the maternal lineages across time. As a result, the tests carried out thus far have not found any commonality at all between the purebred **Przewalski horse** and the domestic horses studied. Until other genetic tests that account for the paternal contributions to genotypes are carried out it will be hard to tell definitely what the role of the **Przewalski horse** has been in contemporary horse breeding. Likewise, this could tell us what amount of influence the **Dongola** had on the **Afro-Iberian Primitive Horse** foundation in southern Iberia versus the **Celtic Pony** influence in the northern part of the peninsula and perhaps even compare these to some **Sorraia** influence in the western part of the peninsula. Since the original mare base foundation of the region is the **Afro-Iberian Primitive Horse** the mt-DNA will simply confirm that part of the formula which in reality is only part of the genetic story.

The **Przewalski** is a telling example of possible hidden paternal influences because we are dealing with a species that has such different traits from the domestic horse that whatever influence it has should be perceivable. Having said that, since the phenotypic traits of the **Przewalski horse** are not seen in 99% of the modern horse breeds, it also would seems like the **Przewalski** a not a very probable example of being responsible for hidden paternal influences. However, it is too early to make definitive conclusions, and we may find that this analysis may be totally different if we look at breeds north and east of Mongolia where the **Przewalski** phenotypes may be more probable.

Regardless of what new facts may fill in the spaces of the puzzle regarding the evolution of the *Hyracotherium* to the *Equus*, the foundation of the **Chilean Horse** eventually goes back at least four million years to one common ancestor in the *Equus* genus. Undoubtedly in the 3,970,000 years that elapsed, independent of man, the *Equus* genus has provided a variety of species and sub-species and variants, most of which have since disappeared. The one we are most concerned about in this book is *Equus caballus,* which, due to its resilience and man's growing fascination with it, has not only survived, but has given rise to a multitude of breeds, including the **Chilean Horse** that you are soon to learn more about.

Is there a Value in Defining Sub-types?

Over the years, hippologists have argued about the various branches, sub-species and categories that were developed in the distribution of *Equus caballus* over much of the world. Some theorists have proposed a single species origin, others have referred to two main sub-species and yet others support as many as six. The fact is that any hypothesis would be based on incredibly little knowledge about how the global distribution of *Equus ferus* and *Equus caballus* took place in the past four or five million years. The maternal genotypes that are arising from the studies of mt-DNA would indicate that the answer lies in more rather than less sub-species and genotypes.

Logically, regional variables in some manner created different types of horses as this species spread throughout the world. As man came on the scene in the Quaternary Period, he evoked some degree of influence in the distribution and population of many equids. However, it seems that in the past 30 millennia, humans have taken a more active role in weaving the horse

into their daily lives. As their own numbers increased and greater mobility stimulated broad cultural exchanges, the equines that had been a part of these humans' lives have likewise had a role in a genetic mélange of their own. My intent in making use of mt-DNA genotypes is not in ignorance of the fact that at some point these all have a common origin, or that as they developed there was an undeniable influence among many of them, or that very few of them truly maintained an absolute degree of purity as they propagated themselves through generalized paths of influence.

My recourse in citing these most often mentioned species, sub-species and variants is simply because these have been identified as lineages of the *Equus caballus* that have a beginning in the few truly wild herds that have been registered in history. They had sufficient conformational difference to imply a discrepancy in type that has been even more recognized in the various subtypes that man has created along their differing geographical spheres of influence. There is no question that a great deal of intermingling has taken place -- in their origins, during the recognition of their existence and subsequently as descendants that have been manipulated by man. In a narrower scale, it is the same dilemma we so often find in dealing with domestic breeds, where type and purity should run hand in hand. In the end, rarely this is the case, but the genealogical and phenotypical delineations we establish serve in some manner to define useful generalizations in the horse population.

The **Chilean Horse**, like most other breeds, has an origin that is full of crossbreeding (although in the **Chilean Horse's** case it is only a product of the genotypes that came over from the Iberian Peninsula) and certainly more so than breeds that came about from a more recent, well-planned formation. As we will see, the origins of all horses identified with South America share an obscure past that we will never fully understand in detail. The only assurance is that many types of horses, most coming from Spanish derivation, entered into the haphazard formula. However, once in the confines of the geographical "island" of Chile, an exceptional story begins to unfold in which an unusual effort is made to define and maintain one of the most unique horse breeds in the annals of mankind.

Figure 1.49 **Figure I.50**

One of the first places in the world to domesticate the horse would thereafter lay the foundation for excellent regional and imported equines that would constitute a genealogy that millenniums later would reach the Americas. These Iberian genes eventually would be solely responsible for the Chilean Horse.