

## Curly Horse History (/)

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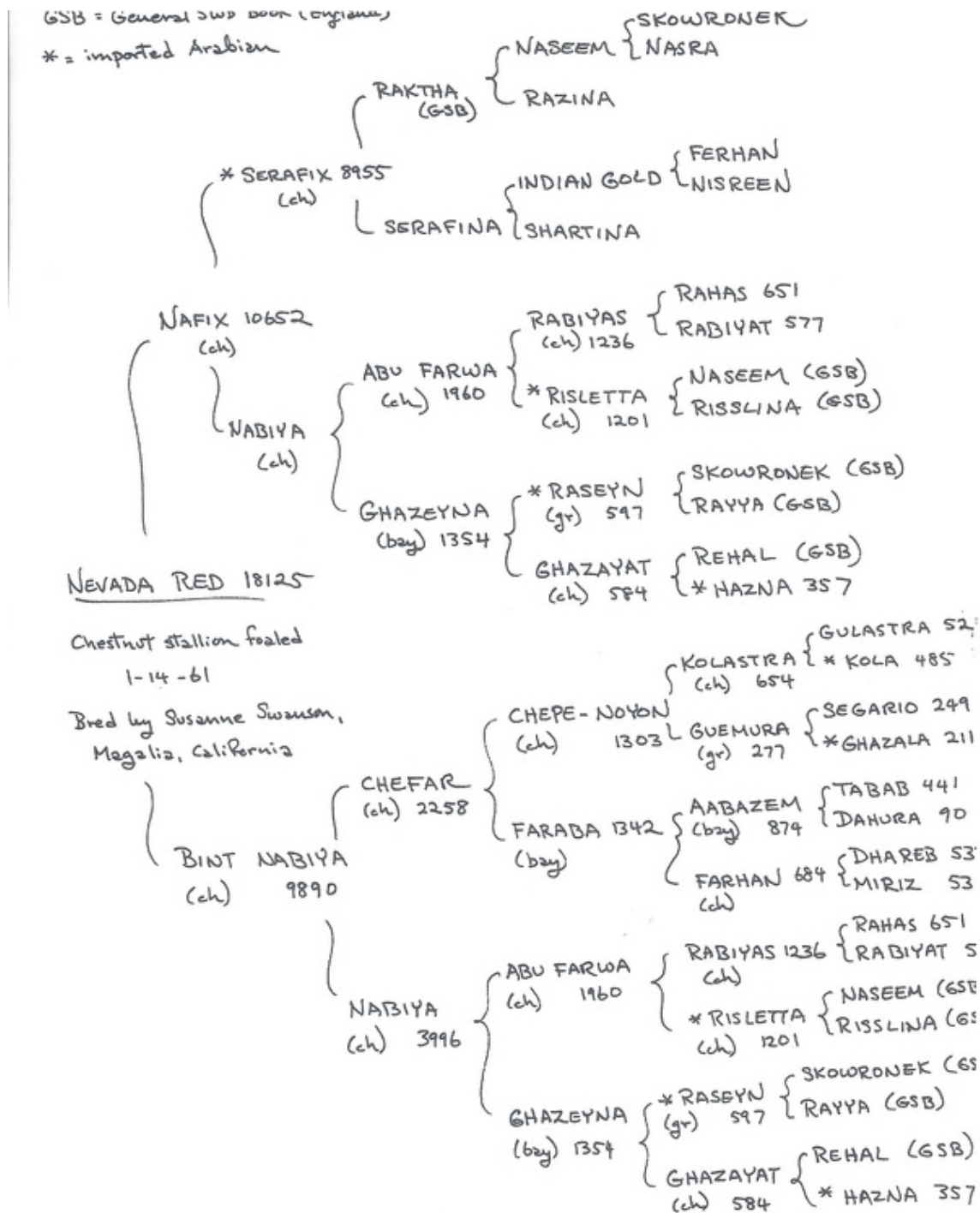
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NEVADA RED

NEVADA RED was not just any ordinary Arabian horse. In his pedigree there are many, many champions of which two, RASEYN and SERAFIX were the most famous of their time. In the sphere of influence on Arabian horses, 'The Golden Cross Blood' of SKOWRONEK and MESAUD are considered the ultimate in Arabians and are still world renowned and highly desired. SKOWRONEK blood is recognized for its perfect type and is regarded as the sire of the 'R' family of sires. The RODANIA strain, exceptional in its classic excellence and natural action, is considered the taproot mare of the 'R' family of mares. These two lines are brought together in the 'Double R Arabian' through the genetic prepotence of RASEYN.

RASEYN, the great-great grandsire of NEVADA RED, was imported in 1926 from Crabbet Park in England. He was black when he was born but turned into a striking dappled grey, which later changed to white. He was well known for his extreme classic type, his beautiful head, and his near perfect conformation. He frequently posed for pictures which included Hollywood celebrities Loretta Young and Gary Cooper. RASEYN was trained as a jumper and later made into a five-gaited show horse. He proved to be one of the world's leading sires of champions in his time.

SERAFIX, the grandsire of NEVADA RED, was born in 1949 in England and became a champion in his native country. In 1954, he was imported from Crabbet Park to California and had the distinction of flying to this country in the same plane with 'Trigger', Roy Rogers' horse. SERAFIX, standing 15 hands, had the charisma, structure, and balance that gave him the heart to know he could do anything he wanted to do in the world. He and his sire RAKTHA, were champions on two continents. His color was a rich copper chestnut almost bronze, and his coat was so satiny it looked burnished. SERAFIX became known as the greatest Arabian sire of all time and was the leading sire of champions from 1968 thru 1972. Though he was shown only in the halter class and was never shown in performance, there is little doubt that his elastic trot with plenty of lift, animation and drive indicated that he would have gained high standards in any class.

NEVADA RED, born in January 1961, was a beautiful chestnut with a question mark star and blaze. His left and right pasterns, right fore sock and both hind socks were white. Benny Damele and his father purchased NEVADA RED in the fall of 1961 and kept him at the ranch through each winter. Since he had been born and stabled in the finest conditions in California as a young one, he had to learn the ways of the Damele Ranch and of the open west just as their other horses did. No special treatment was given to him. When he turned two years old, Benny broke him and with Benny's training, NEVADA RED developed into an outstanding ranch horse. He quickly learned the knack of cutting a cow or calf from the herd or just out running another horse that was to be restrained. Had NEVADA RED ever been given the chance to perform in a western horse show, there is no question that he would have become a great champion. The Dameles decided to let him run with their Curly mares on their ranch from spring through fall to instill his great Arabian bloodline into the Damele Curly herd. As a matter of interest, all of the saddle horses presently on the Damele Ranch are out of NEVADA RED. In the late spring of 1979, out in the crested wheat pasture south of the Damele Ranch, NEVADA RED had a freak accident and was injured severely. He attempted to make it back to the ranch but made it only as far as the road where Benny found him. He was one of the finest horses Benny ever rode.

It was through these two world champions, RASEYN and SERAFIX, that we have our own special champion, NEVADA RED, and we are most proud to have his breeding instilled into many of our Curly horses.

Story on Nevada Red by  
Benny Damele

Compiled and Narrated by  
Dale E. Woolley

December 1984

A. A. HORVATH, PH.D.  
122 NEBA AVE. S.E. TELEPHONE 243-4814  
ALBUQUERQUE, N. M. 87106

January 12, 1974

Miss Sunny Martin, Secretary  
AMERICAN BASHKIR CURLY REGISTRY  
Box 453  
Ely, Nevada, 89301

Dear Miss Martin:

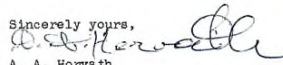
Your long descriptive letter, mailed January the 9th, reached me today, and I wish to thank you for it, and am looking forward to receiving at least one picture of a typical Curly, which is as close as possible to the original type. A picture is of unique value in allowing one to visualize things which can not be substituted by a text, irrespective of its perfection.

To this end, I take the pleasure of inclosing a picture of the stallion MAMAI II, age 5, taken at the Agricultural Fair in Moscow, USSR, in 1954. It is listed as being of the Bashkir type, and was awarded a certificate of II-nd degree. Its measurements are: 147 - 152 - 169 - 21.0.

I am interested in the wild horses of Asia, and trust that your Registry will be interested in the back-breeding of the Curlys as a sideline.

With best wishes,

Sincerely yours,

  
A. A. Horvath

P. S.: Please advise about the issue of the Western Horseman with the article about the Curlys.

AAH

#### CHARACTERISTICS --

1. Extra high red blood count, giving them ability to work at high altitudes and be exceptionally strong for their size
2. Quick breathing at work, may pant
3. Quick pulse and respiration recovery
4. Withstand extremely cold temperatures due to dense undercoat, curly top coat and small nostrils
5. Double layer of fat
6. Double nasal passage
7. Veins located deeper
8. Extra thick hide, more like that of a cow than a horse
9. Very dense bone
10. Exceptional ability to assimilate feed, requiring less
11. Do not tolerate grain well, seldom requiring it unless on a heavy work schedule
12. Very worm-resistant, and should be checked for worms before worming
13. Curly coat is non-allergenic
14. Hair of Curly coat is round instead of flat
15. Pregnant mares may carry foals a full year (or more)
16. High milk yield in mares, 3 to 6 gallons daily at peak
17. Mature slowly, usually fully matured at 6 to 7 years
18. Can completely shed mane and tail in summer

#### BREEDING PRIORITIES FOR CURLY-COATED HORSES:

- 1st Disposition
- 2nd Intelligence
- 3rd Soundness
- 4th Performance
- 5th Easy Gaits
- 6th Conformation

SPECIAL NOTE: As Curlies are not being bred for racing, it was voted to not breed to the "speed" breeds; namely, Quarter Horse and Thoroughbred.

4.

#### To Our ABC Breeders:

We send this ABC Handbook to you to help you in your venture of breeding "Curlies".

Would like to stress that we are striving to keep our ABC horses "natural" -- and keep their excellent qualities. We are very fortunate indeed to have probably the last breed of saddle horse size that is so natural -- with its gentle disposition, high intelligence, stout strong bone, soundness, versatility of performance, strength, endurance and easy-keeping qualities.

They do need love but do not need pampering, requiring neither box stalls, blankets, grain, or seldom even shoes. Being cold-weather horses they do appreciate overhead shade from the hot summer sun, or a windbreak in winter. They will stay healthier and happier with space to graze, and do have a strong herd instinct.

Also, must warn against trying to "change" or "improve" the breed. Too many other breeds have undergone many changes by man with the thought of "improving" them and have met so often with disastrous results, losing the originality and traits that first brought attention to them.

Naturally, we are proud that you have chosen to breed our unique and unusual Curlies. We hope you understand what a truly priceless breed they are and that we all must strive to maintain their wonderful qualities.

Norman Dills, President, ABC

This handbook on I.D. Standards for ABC horses has been prepared as a guide for breeders by the following committee appointed by President Norman Dills:

Benny Damele, Chairman	Austin NV
Mel Blue	Litchfield CA
Sunny Martin	Ely NV
Joe Mead	Fairbanks AK

We sincerely hope it will be of help to all ABC breeders, and especially those who are just starting to breed Curlies.



Thought you might Be  
interested in This Account  
of Curly Horses 1802 -

From the Book - The Sioux  
1798 - 1920

A DAKOTA WINTER Count  
By Alexis Praus

Pice Richardson  
4-12-87

## Picture Writing of the American Indian

from Gayle Sharp --

two pix of Curly horses in winter counts in 1803.

Both of them were accompanied by explanations of the Indians, who said they were curly horses, and one said there were other curly horses running loose on the plains. This account was first published in 1903 or close to that.

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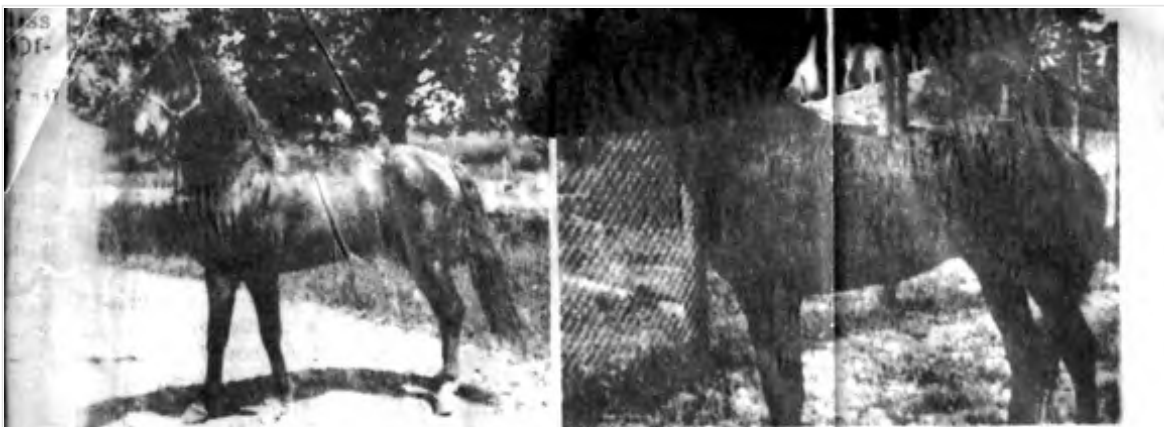
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Two of the Curly Horses owned by Glen Kugler of Dayton, Oregon, — Big Red & Peter J.

Little has been published or said about the Curley-haired horses. Reports concerning the curious breed have occurred since the first trappers and cattlemen arrived in Canada, Wyoming and Nevada. These horses appear to be "fur covered", and early explorers referred to them as "buffalo horses". The coat is soft as silk, and curly as the hair of a poodle. The mares are heavy milkers, giving from four to six gallons a day. Their hoofs are small, hard and black, even when the legs are white, and they are short backed with a good shoulder. No matter with what stock they are bred, they have proven so fantastically potent, that the mare always transmits her own special characteristics. The ability to survive under the most severe circumstances exceeds that of all other wild horses.

It is suggested that this breed was possibly introduced from Russia, as the only known breed that possesses similar characteristics is the Bashkir horse, native to Russia's Bashkir State, on the east slope of the Urals, and to certain regions around the Black Sea and North China.

Never were horses of this breed imported to America during historic times, so when did they arrive and from where? Had the breed arrived in any appreciable number, they would have over-run the Northwest territory due to their ability to survive. Only occasionally were they found running with a herd of mustangs, descended from Spanish horses which had been captured and brought North by the Indians. Since the breed was found wild in Canada, Idaho, Montana, Washington, Oregon, Colorado and Nevada, but never in California or Utah, or any south-western state, it provides fair evidence that the breed was introduced from the far Northwestern boundaries of this continent, which the Spaniards never reached.

A few curly horse descendants from wild stock still exist. On the Three Bar Ranch in central Nevada, these strange animals have been bred by the Damele family since 1898, when the ranch founder, Peter Damele, roped three of them from a herd of thousands of other horses running wild in the Peter Hanson Mountain Range. His son now breeds and raises them, all des-

cended from this bloodline. Other early ranchers sometimes traded with the Indians for them. The Dameles remember one real severe winter in 1932, when the curly ones were the only ones to survive.

A few ranches in other western states have curly horses descended from wild stock, but most obtained them from the Damele Ranch near Austin, Nevada. Efforts are being made to establish a registry for the breed.

One such ranch is in Oregon near Dayton, where Glen Kugler is raising the curly horses. They are standing two stallions, Big Red, sired by a palomino quarter horse, and out of a curly mare; also one by a 1/2 Arab, out of a curly mare. Mr. Kugler obtained his curly ones from the Damele ranch, and plans a breeding program to raise good stock of this strain.

If you are in the area, stop and see this strange breed, at Rt 2 Box 206, Dayton, Oregon. Mr. Kugler can tell you a great deal about them, and you will find it very interesting.





## ALASKA EQUINE CENSUS - 1971

Alaska's first census of all equine has been completed with 3,000 horses, ponies, donkeys and mules reported in the State as of September 1, 1971. This survey confirmed what long has been suspected, that the equine population is larger than the number of dairy cows in Alaska.

The census itself was a direct result of the Alaska Crop and Livestock Reporting Service, State Division of Agriculture, Cooperative Extension Service, and the Institute of Agricultural Sciences cooperating in the joint venture to obtain reports on the total equine population. The census was largely a mailed survey. The survey was conducted during July and August, 1971. The Crop Reporting Service collected, edited, tabulated and analyzed the data.

The total of 800 respondents reported equine. Of Alaska's 5 crop reporting districts, Matanuska Valley, which includes the Anchorage area, accounted for over half of the State's equine population. The Kenai Peninsula reported the second largest number, slightly more than Tanana Valley. The Southwest reported the fourth largest number of equine while the Southeast reflects the smallest number in the State.

Some explanation relating to the survey data, collecting and summarizing follows. First, the Tanana Valley area is bounded on the east by the Alaska-Yukon border; on the south by a line east and west through Slana to Hurricane; on the west by the 152nd Meridian and on the north by the Yukon River. The Matanuska-Susitna Valley area, is bounded on the north by the Tanana Valley boundary; on the east by the Alaska-Yukon border, on the south by a line from Pt. Riou through Portage and the Turnagain Arm and on the west by the 152nd Meridian. The Southwest district includes the Aleutian Islands, Kodiak Island, all areas west of the Matanuska-Susitna and Tanana Valley boundaries and north of the Yukon River. The Kenai Peninsula and the Southeast district boundaries are self explanatory. (See map on last page.)

Secondly, there are a few assumptions concerning the interpretation of the tables. A question of the number of donkeys, mules and burros was not asked separately, but was written in by several reporters (Tables 1 and 2). The question concerning home-grown feed versus purchased feed is believed to have been interpreted mostly as home-grown hay and pasture land vs. purchased hay (Table 3). The pasture use is especially included in the Southwest where a small amount of hay is produced but not much purchased feed was reported. Only the number of reports were tabulated for the question asking "the primary purpose for which equine were kept". Reporters indicated more than one primary purpose resulting in a total grossly above the actual number of reports (Table 4). The terminology of "farm" (Table 5) includes homesteads, urban and rural parcels of land. The neighbor's farm and non-farm residence could, in some cases, be synonymous. Table 6 indicates the number of reporters who had less than 5 equine, more than 5 but less than 10, and 10 or more equine.



M. ELLIOTT SCIENCE April '84

CROSSCURRENTS

**E. equus: immigrant or emigrant?**

From the moment it was discovered it appeared to be an impressive fossil: the nearly complete skull of an ancient horse. Barbara Quinan, an amateur fossil hunter on a class field trip, found it embedded in the sediments of the Borrego Badlands. Most of the fossils from the badlands—an area of stark, spectacularly eroded desert hills a few miles east of Borrego Springs, California—are no more than bone fragments, so Quinan quickly summoned her teacher, George Miller. But when Miller saw the skull, his reaction was one of confusion. "It can't be a fossil," he said. "It just can't be."

The skull Quinan had found appeared to be that of a modern horse, *Equus equus*. But horses are supposedly absent from the fossil record of the New World. Paleontologists are convinced the immediate ancestors of *Equus equus* evolved in North America, spread to Asia via the Bering land bridge, and then died out in the New World. Most experts believe *Equus equus* itself arose in Asia and first arrived in the New World in the company of Spanish explorers.

At first Miller, curator of paleontology at Imperial Valley College Museum in California, speculated that the skull might not be a fossil at all but the remains of a horse that wandered into the badlands in recent times and died. But the skull, found *in situ*, was partly mineralized—a process that takes hundreds of thousands of years in the desert climate. And Miller's files at the college showed that the bones of mammoths had been discovered in the layers of sediment directly above and below the layer containing the horse skull. "I was intrigued," the taciturn scientist admits.

Another possibility was that the fossil was that of a long-headed zebra, *Equus dolichohippus*, which, like the ancestors of the horse, lived in the New World before emigrating across the

wet chemistry tests, laboratory procedures used by chemists and physicists to do elementary analysis. Wet chemistry, for example, is a process by which chemicals are added to a sample and the reactions monitored to determine constituent chemicals. But these methods are time consuming and tedious. Moreover, they destroy the sample, which PIXE doesn't, and it is more precise than nondestructive techniques such as X-ray fluorescence. Recently Nelson helped a historian and physicist at the University of California at Davis determine the actual elements used by Gutenberg and his successors in the history of printing. Using PIXE to analyze a 15th-century Gutenberg Bible, they were able to study the relative paper and ink—for example, the copper to lead ratio—without destroying the sample. Art historians have been using PIXE to identify artists and study the peculiar mixtures of pigments in their works.

Nelson foresees a time when public officials may use PIXE to conduct large surveys that will reveal problems with "hair mail," since hair acts as a reservoir for many of the trace chemicals in the body. People could simply cut a few strands and send them in. In quick order, samples could be scanned for mineral abnormalities, air pollutants absorbed by hair, or other health concerns. In one recent case, Nelson tested the hair of a man suffering from muscle spasms and detected tremendous amounts of potassium. As it turned out, the condition was related to the inability of the man's body to control potassium. And a few years ago at Lincoln Lab, operated by the Massachusetts Institute of Technology, experimenters picked up evidence of mercury poisoning in the hair of an Iraqi man who had died; they confirmed, from eating grain treated with mercury-laden fungicide.

PIXE could also prove a reliable tool for forensic medicine. Each person's unique interaction with environment, diet, and metabolism leaves its calling card in the hair. Thus, police scientists can match hair found at the scene of the crime—in a manner akin to fingerprinting—with that of a corpse or criminal suspect.

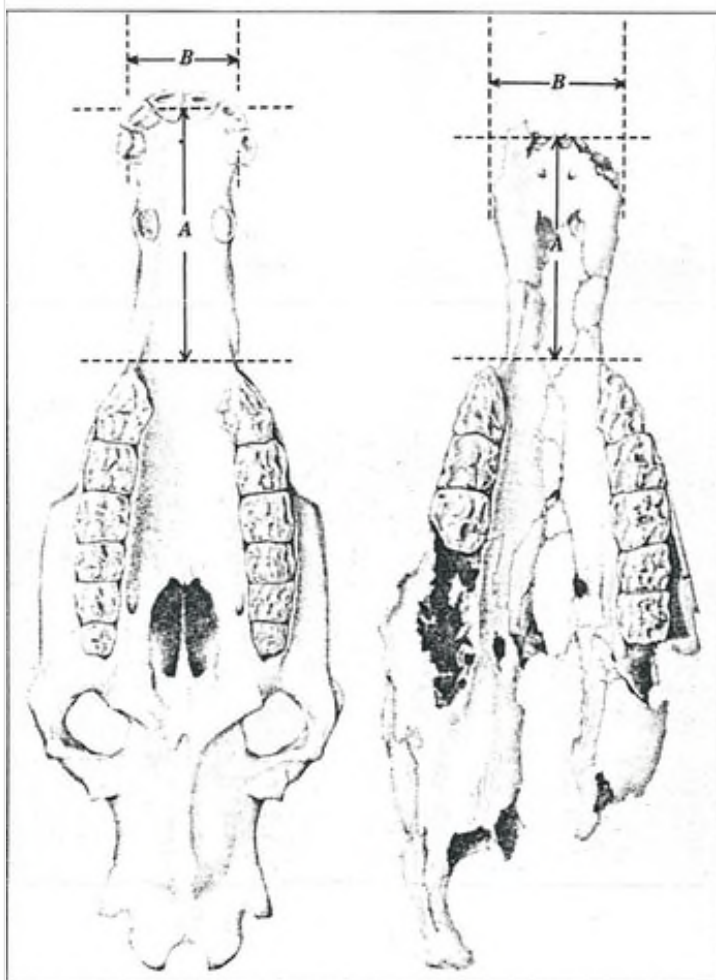
How fast could PIXE do that kind of work? "If you walk in here," says Nelson, "I can pluck a hair from your head, mount the lock in PIXE's target chamber, and five minutes later we will have a spectrum of six to 10 elements analyzed."

—C.R. Crankmore

SCIENCE 84



## CROSSCURRENTS



The rostral index can be used to discriminate between fossil skulls of horses and long-headed zebras. It is derived by measuring the length (A) and the width (B) of the alveolar surface of the muzzle and dividing the width by the length (B/A). The reconstructed long-headed zebra skull, left, yielded a rostral index of .43. Miller's fossil, right, has a rostral index of .60, within the range of .56 to .64 exhibited by modern horse skulls.

Bering land bridge and later died out in North America.

"When I first saw Pearl," says Miller (Quinan named her find in honor of the Pearl Harbor Day—December 7, 1978—on which she found it), "I had no way to tell a horse from a long-

headed zebra. Yet I instinctively thought it was a horse." Finally he realized why: It appeared shorter than a zebra skull.

After measuring the width of the muzzle, or rostrum, and its length, Miller divided the former by the latter

and got a ratio of .60. His subsequent research has shown that similar measurements from various specimens of long-headed zebra result in ratios of .39 to .51, while those from modern horses, including Przewalski's horse, the only true wild horse, fall into a higher range of .56 to .64. Miller says his "rostral index" is an excellent way to tell horses from long-headed zebras.

"Now I can say positively that *Equus equus* was present in North America about one million years ago," he says. Miller is convinced the identification of the skull is "beyond argument," but he expects an argument anyway. And he'll get one.

Many experts insist that it's impossible to tell *Equus equus* from *Equus dolichohippus* unless all the fossil's teeth are intact, including the incisors and the molars. Miller's fossil lacks the lower incisors. Others are skeptical about the skull's age, believing it is probably not as old as Miller thinks.

Miller is hoping to find a layer of volcanic ash in the badlands that would make it possible to date the skull with the potassium-argon method, though in three years of concentrated work he has found no such layer. But he feels that the mammoth bones found above and below the horse skull, coupled with a lack of bison bones in the same layers, are strong evidence the skull is from the Irvingtonian faunal era, which lasted from about two million to 250,000 years ago.

Miller plans to publish his findings within a few years, when the research is complete. In the meantime he will measure the skull in every possible way and compare the measurements to other fossils all over the country. "In this business," says Miller, "you're never satisfied." He expects to find other unidentified or misidentified skulls that will corroborate his theory.

If the skull is what he thinks it is, "it reopens a lot of questions about the evolution of horses," says Miller. "Barbara opened up a real can of worms when she found this thing."

—Gordon Smith

SCIENCE 84



Peter J



# NATIVE AMERICAN CURLY HORSES

Reported by:

Marlin Neidhardt  
Rare Breeds Ranch  
Crawford, Nebraska

The history of Curly Horses and Native Americans goes back many, many years. The Curly horse which has gained recognition through the American Bashkir Curly Registry started as a breed preservation project over 25 years ago. Through the foresight of Sunny Martin of Ely, Nevada and other folks who she encouraged, this unique horse was sought out and recorded, one by one.

The recorded horses were of many different types and colors. Thus there are several mysteries involving curly horses. The curly gene has appeared in many breeds, including draft horses, ponies, arabians, fox trotters, quarter horses, appaloosas, pintos, etc. Now we are back to the old question, "Which came first, the chicken or the egg?" In other words do all horse breeds have a possible curly gene or somewhere back in their lineage was there an infusion from a curly line that only crops up from time to time?

One thing that we do know is that Native American Curly horses had become an even more rare commodity than the Curly horses that were found and recorded by the registry.

## BREED TRAITS

They appear as the "pure" curly in that they follow very distinctive characteristics and are extremely consistent in reproduction of their type. Curly horses completely shed out the mane hair and tail hair each summer, to grow back during the winter. Even though the mane hair is usually so fine and soft as to resemble a child's hair, it is quite kinky, and this ability to shed the mane is perhaps nature's way of coping

with the corkscrew curls, as it would become quite impossible to manage if it became matted through years of growth.

Their body coat also sheds out in the summer and they become wavy or fairly straight haired with their curly coat returning in late fall. Several winter coat patterns have been observed, from a crushed velvet effect, to a perfect marcel wave, to extremely tight ringlets over the entire body. It has been tested and proven that flat hair is curly, yet when the hair of Curlies was tested, it was found to be round! One other thing about their hair should be mentioned, and that is that a number of owners who are allergic to horses find that they are not allergic to their Curlies! Hypo-allergenic horses!

Outcrossing produces color--and since Curlies have necessarily been crossed with other breeds due to their own scarcity, they come in all colors -- even with Appaloosa and Pinto markings. However, we have noted that most sorrels have flaxen legs, which is rather unusual, and this seems to be the basic color of the Bashkir breed in Russia.

Curlies are of medium size, somewhat resembling the early day Morgan in conformation and a number of traits have been found in this unique breed that links them to the true primitive horse. Many individuals have been found without ergots. Some have small, soft chestnuts. Their soft, unexpressive eyes have an unusual Oriental slant to them, which gives them a sort of sleepy look, but which also tends to give them a larger range of vision to the rear. The sleepy look is very deceiving, as they have a proud carriage, are very alert, and not lazy.

Their unusually tough, black hoofs are almost perfectly round in shape. Many Curlies with

white legs will have four black hoofs. They have an exceptionally high concentration of red blood cells; stout round-bone cannon; straight legs that also move straight; flat knees; strong hocks; short back which indicated five lumbar vertebrae; round rump without crease or dimple; powerful rounded shoulders; V'd chest and round barrel, all of which contribute to their strength and endurance.

The foals are born with thick kinkly coats, even inside their short broad ears that sometimes tip back at the top, and also have beautiful curly eyelashes. They have an unusually affectionate disposition. When excited or at play the foals move at a bold trot with their tails absolutely straight in the air.

Last, but not least, is their calmness and gentle disposition. They will, of course, struggle frantically when first roped or haltered but their gentleness willingly responds to kindness and affection.

Performance-wise, Curlies are a no-nonsense horse that have an uncanny ability to do what is asked of them.

## THE ANCIENT LEGEND

The Native American Curly Horse legend goes like this: "They first appeared to the people as a group of large curly, red dogs. The color preferred was the sorrel (red) and chestnut which is believed to be the correct coloration for the breed.

It appears that the Indians had not seen horses prior to the sighting of the "large curly, red dogs" as they were called for lack of another term.

It is known that the Russians came across the Bering Strait traveling by horse and sled on the ice. Curly horses believed to be the Bashkir Curly, native to Rus-

sia, were used. The people stayed and trapped furbearing animals and in spring they returned with boats laden with furs and left the horses behind. It is theorized that this is where the horses originated.

These horses would then have migrated from the north into our country instead of from the south as the Spanish horses did.

Some time after the legend of the curly dogs it has been found that the curlies were described by the Native Americans as the "horses before there were horses" which would seem that the curlies were apparent prior to the arrival of the Spanish horses in North America.

We have recently found that the curlies were known as "mystery or Mystical Horses" by the Sioux and as an old chief stated there were "Never many".

The Native American Curly horse is shown in "Winter Counts" (Indian calendars) and writings that date back beyond white man. Our Curly horse information comes through the Northern Sioux tribes only, having friends and acquaintances on these reservations.

When the white man started his aggression and take over of the Indians, the Indians reverted back to old Indian religions for security. These rituals were known as the Sun Dance, Horse Dance and Ghost Dance and others. The performance of these rituals struck fear into white men who retaliated by forbidding their performance and further oppressing the Indians.

The largest action against the Indians in the Dakota territory was the final one which took place at Wounded Knee, (now Southern South Dakota). Here the white men killed Big Foot's band of people and most of their

(continued on next page)

### Native American Curly Horses (Continued)

horses were killed there also. Under the United States constitution the Indians were guaranteed freedom of religion but they found that it had to be one of the white man's religions.

After this time it is our belief through research that there were only a few curly horses left on the Standing Rock and Fort Berthold Reservations in the Dakotas.

The curly horses of Rare Breeds Ranch are derived from these two lines plus some of the Ernest Hammerick line of Mobridge, South Dakota which are also Standing Rock stock. The Standing Rock horses were remnants of horses that were not with the people at the massacre of Wounded Knee. They were among the "turned out" horses belonging to those peoples, thus they were saved.

The Fort Berthold horses were discovered in a continued search

for Native American Curly horses in an effort to find outcross bloodlines to keep the Standing Rock stock strong. Fortunately we discovered these horses through inquiries as to who knew of any curly horses that might remain at Fort Berthold. This "find" turned out to be a very small group of horses that belonged to an Indian family who had possessed several curly horses and then traded for two curly mares from Sitting Bull's band when they were enroute back from Canada after fleeing the whites after the Custer massacre.

This family related the acquisition of two mares from that band of people and how they nurtured them and had used those horses through many years. These horses were incredibly gentle in nature. We acquired the mare which we call "Miss Fort Berthold" and her yearling daughter and her baby filly that summer. This family had already sold several of the oldest of this stock

through the sale barn (stock that had grown too old to survive another winter.) this left them with one old favorite stallion that was buried with the father of the family when he passed away, according to tradition.

Further Native American use of the curly horse denotes them as being sacred and for the possession of chiefs. It also showed them to be used as buffalo running horses. Possibly because of their sacred status they were felt to have the power to carry their chief to a successful hunt, which apparently they did.

### RARE BREEDS RANCH CURLIES

The American Bashkir Curly horse registry has grown in numbers through the years but the Native American line of the curly is extremely rare. They appear to be the "purest of curls". At Rare Breeds Ranch we have tried to preserve the Native American Curly and have a herd of 25+ head

that we have raised.

These horses follow the best of curly traits, they sorrel in color, many with legs, mane and tail, typical breed. One more trait unique to the Native American Curly is the fact that many of them have "Medicine N" which are roan spots or black spots. These horses are 100% curly and produce curly foals.

We now find that due to the workload we are unable to continue with this breeding program and wish to find new breeders who will continue to preserve these rare and interesting horses.

For any further information please contact:

**RARE BREEDS RANCH**  
Marlin & Maureen  
Neidhardt  
P.O. Box 66  
Crawford, NE  
69339  
(308) 665-1431 days  
(308) 665-1836 evenings

### Dear Curly Horse Breeders, Owners and Friends,

Please take note of our coming curly horse sale. Due to press of time we find it necessary to even out our work load so the decision has been made to offer these horses for sale.

We have chosen to tell the members of the American Bashkir Curly Association in hopes that these horses will be purchased by folks who will find them to be an asset to their own breeding plans and by folks who will enjoy them for what they are, a rare and special breed.

The article tells about the Native American Curly horses. This sale offers an excellent opportunity to anyone interested in curly horses to acquire extremely strong bloodlines at affordable prices.

Because of distance involved for many of you, please feel free to call and ask questions and to place bids ahead of time. All

horses will sell, there will be absolutely no back bidding.

If you are interested, please call for more details and for a listing of horses offered.

Also, enclosed find a flyer introducing RARE BREEDS

JOURNAL which we publish.

If you are interested in learning all about rare, minor and exotic types of animals you will enjoy reading RARE BREEDS JOURNAL.

If you request a "Sample copy"

we will be happy to send you a FREE of charge.

Sincerely,  
**Rare Breeds Ranch**  
and Rare Breeds Journal

## SPECIAL CURLY HORSE SALE


DUE TO PRESS OF TIME WE WILL  
DISPERSE OUR HERD OF CURLY HORSES ON

**WEDNESDAY, FEBRUARY 21, 1996**

**AT STURGIS LIVESTOCK, STURGIS, SOUTH DAKOTA.**

*The offering is made up of perhaps the purest of curly lines available in the country. Developed from three lines of Native American horses.*

*Consigned are 12 bred mares, 2 coming 2-year-old fillies, 2 coming 3-year-old fillies, 3 coming 1-year-old fillies, 5 2 and 3 year old stallions, 2 yearling stallions and 2 mature herd sires.*



**2 Yr.-Old Native American Curly Stallion in Summer Coat.**

For details or to bid, etc., call

**MARLIN OR MAUREEN NEIDHARDT**

Rare Breeds Ranch, Crawford, NE.

**(308) 665-1431 Days • (308) 665-1836 Eves.**





#### 1798—Winter of the Blue Feather Dances.

The symbols for this year and for 1801 are identical and probably refer to the ceremony known among the Dakotas as the Hunka.\* This ceremony was of religious and social significance and was performed rarely and then only for children of wealthy and influential families. It was a ceremony of reconfirmation of a father for his child and for the child's health, virtue, and success in life. It seems safe to assume that the Hunka and blue feather dances were similar, if not the same, ceremonies.

#### 1799—Coming of the White Traders Among the Indians.

Previous to 1794, the Tetons on the Plains had to return to Minnesota each spring for their supplies of trade goods. At this date Jacques d'Eglise was the first white trader to advance to the upper Missouri villages of the Arikara. He probably dealt with the Tetons at the same time. In 1797-98 he sent Registre Loisel, "Little Beaver," to set up permanent trade with the Dakotas. A reference is made to Little Beaver in 1811 and it may be the same individual. The name, however, was a fairly common one among Indians. The Swift Dog Count identifies the trader as a white man named Clark. Another name is given by High Dog.

#### 1800—No Water Only From One Spring.

Possibly still on foot, the band must have suffered severely from the periodic droughts on the High Plains. The High Dog and Swift Dog texts explain the association of the beaver and the water hole when they state that it was a dry year and that water was found in beaver holes (High Dog) and a beaver dam (Swift Dog).

#### 1801—Winter of the Hair Dances.

The meaning of this entry remains to be explained. This glyph and the one for 1798 are similar in detail and possibly in meaning also. The pictographs of both the High Dog and Swift Dog counts confirm the

\*For a description of the ceremony, see Standing Bear, Chief Luther, *Land of the Spotted Eagle*. Houghton Mifflin Co., Cambridge, Mass., 1933, pp. 27-32.

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From Book *The Sioux 1798-1920*  
A DAKOTA WINTER COUNT by Alex Praus

possibility that this refers to the Hunka ceremony. Their texts, however, also refer to hair and not to feathers as in 1799.

#### 1802—Capture of Curly-Haired Horses.

Around 1775 advance parties of Dakotas crossed the Missouri River freely after the Arikara were forced to abandon the country in the area of the Great Bend. At this time, most of the Tetons did not have horses but began to acquire them rapidly by trading and stealing. When the group who kept this count first obtained horses is not indicated. Curly-haired horses, however, were enough of a curiosity to be used as a yearly marker. The Crows were early possessors of them and, in this case, may have been their source. It is said that curly-haired horses can still be seen on the Plains. This variety of horse is mentioned in other counts and is probably not a freak or a sport. In other accounts they are referred to as singed, burned, or woolly.

#### 1803—Capture of Shod Horses.

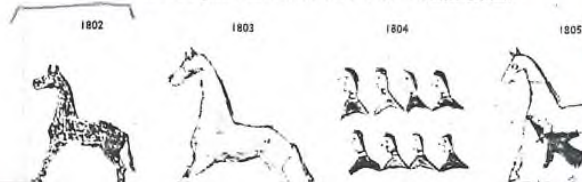
Horse stealing was the accepted method of acquiring wealth and prestige among all Plains tribes. This entry refers to stock originally belonging to whites since Indians did not shoe their horses. They may have been United States Army horses stolen by the Dakotas or other Indians, from whom they were taken in turn. The Swift Dog Count tells of a shod horse being brought among the Sioux by a man in a blue coat while the High Dog record states that shod horses were taken from the Crows.

#### 1804—Winter When Eight Sioux Indians Were Killed.

Eight figures shown in the outline of heads and shoulders are probably a record of an unsuccessful war party. Details of their death are lost though they probably followed the usual pattern of a raid, a retreat, and a surround by the attacking party in overwhelming numbers.

#### 1805—Two Crow Indians Riding Double Were Killed.

A horse and two prone Indians with top-knots indicate the death of two enemies. This event and the number of victims is supported by several other winter counts. Because of their recurrence in similar patterns, war exploits are difficult to correlate in winter counts.



#### ORIGINS AND METHODS OF HORSEBREEDING

(A.D. 161-180). The Roman studs were often located in places which were to remain famous for horsebreeding in medieval and modern times - in Asia Minor at the 'Villa Palmatii' (near Tyana in Cappadocia), in Spain, in Sicily, and on the karst lands of Apulia and Calabria in South Italy and Istria in north-west Yugoslavia, where the famous Lipizzaners were to be bred from the late sixteenth century onwards.<sup>4</sup> North Africa was particularly noted for racehorses, which the Romans called Numidian, and we would describe as 'Barbs' (i.e. from the Berber or 'Barbary' coast of North Africa). They ran in chariot races, and are illustrated in several mosaics, those of North Africa being noted for the number of horses which are named; we find, for instance, 'Amandus' (Lovely), 'Frumitas' (Delicious), 'Adorandus' (Adorable), and 'Crinitus' (Curly). Excavations made in the nineteenth century at the Baths of Pompeianus at Qued Athinemia near Constantine in Algeria revealed both the remains of stables of exceptional size and mosaics depicting the stud farm with the horses' names over their individual stalls.

Because the main breeds of horse had all reached the Mediterranean countries by the time of the Roman Empire, it should not be thought that the supply of horses was assured for ever. On the contrary, it is a notorious fact that breeds can be 'lost' much more quickly than they can be established. Breeds are maintained by ensuring that good mares are not covered by any stallion which has not been specially selected. This means that, since male animals are extremely persistent in nosing out females in season, the mares have to be closely guarded. If they mated at will, the result would be disastrous. As Miklós Jankovich has put it:

It is notorious that feral horses - the descendants of runaway domestic horses - after only a few generations lose the properties conferred by domestication and resume more and more those of their wild ancestors. Thus the mustang of the American plains, now itself on the road to extinction, lost no time in shedding the attributes of the pure-bred Andalusian, and acquired recognizably those of several different ancestral



20 A floor mosaic for a Roman horse-breeder at Hadrumetum (Sousse in Tunisia). The tethered horses are named 'Ameo', 'Dominator', 'Adorandus' and 'Crinitus'.

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6th August, 1996  
 Patricia Skinner  
 300 Officer South Road  
 Officer Victoria 3809 Australia.

Dear Registry Staff

I am sending in my registration for my second foal by 'Donjek'. I have not as yet got the letter from the vet stating that 'Donjek' does not have any heritable traits. He has been examined by my vet and he passed him and he was getting his wife to write a letter for you but because of work commitments I have not had the opportunity to collect it as yet. I am sending the registration application in as the filly is getting older and will soon be six months old. I will send the letter on in the next couple of weeks. He was examined by a vet (Lisa Metcalfe) in Oregon before leaving the USA and she passed him as okay. I was wondering if it would be possible to pay membership dues and registration fees etc by Visa in the future. I could place my Visa number on the application and sign it and you could bill my Visa account in the same way as other businesses do. It is so expensive to get overseas cheques written that it can double the cost of any transaction. In addition one has to actually go to a bank during business hours to get the cheque which is quite difficult to manage at times.

I was thrilled with my first two foals which were both curly but sadly I had to have one put down as he was bitten by a spider. His leg was paralysed and starting to go bad. There is no cure for such a spider bite apart from amputation of the affected limb or body part. He was able to get around perfectly well on three legs but I did not think he would be able to live his adult life like this. He was identical to the filly that I am registering except his head was covered in small tight curls and hers is wavy.

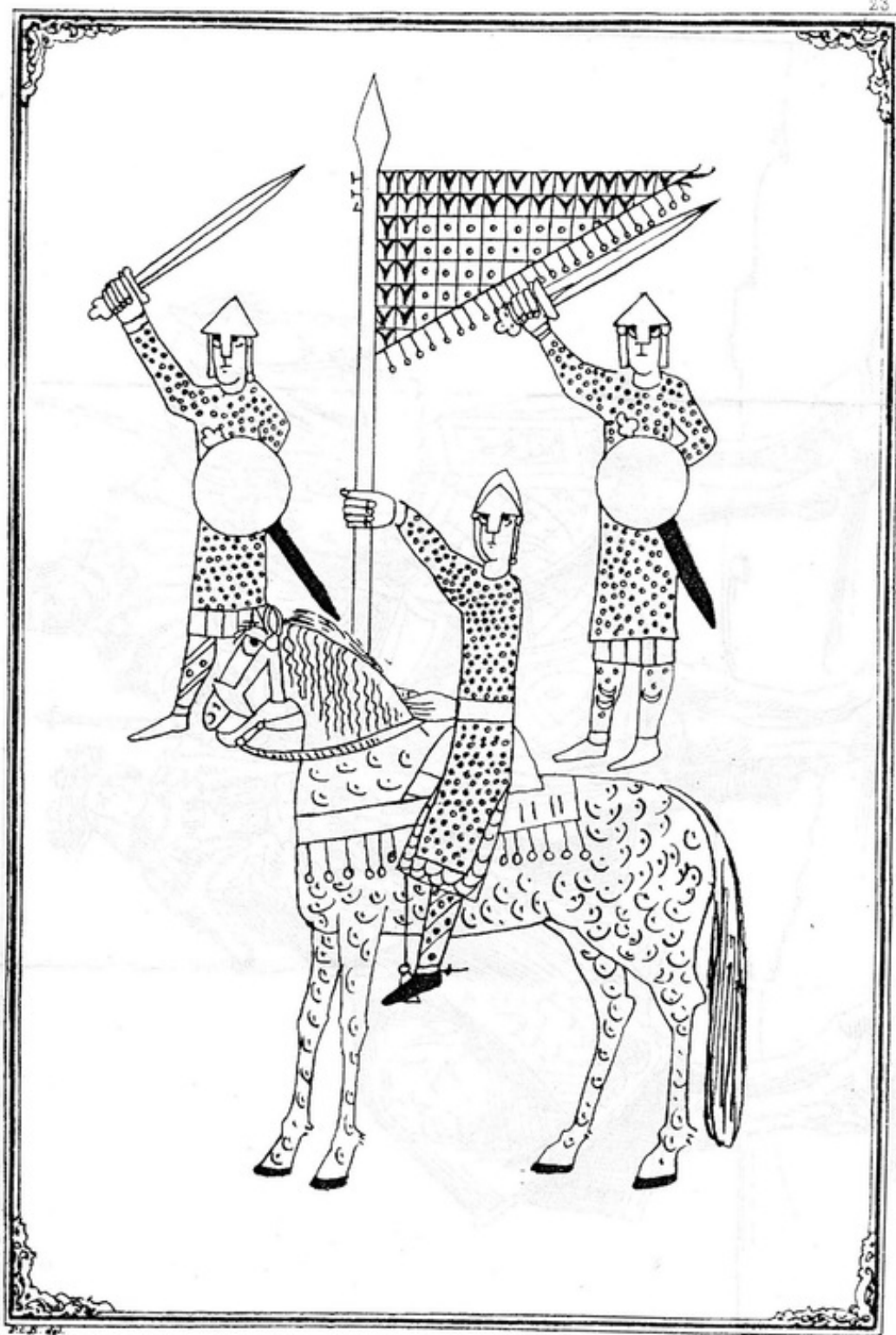
I am also enclosing some photocopies of horses taken from a book entitled *Horses of Antiquity* which I found in the library. The book contained horse drawings made by artists around the world in earlier centuries. There were sketches drawn by English, French, Dutch, German, Spanish and Italian artists. All of the drawings depicted straight haired horses with the exception of the German and Spanish ones. The horse drawn by the Spanish artist looks decidedly like it must have been curly. It would seem that in the eleventh century there may have curly coated horses in Spain. The German drawings also appear to depict horses with a curl or wave in their coat. Particularly as the artists have drawn what appears to be straight haired and wavy haired horses in the same sketches.

Another thing which may be of some interest to breeders is the research which has been carried out on wavy coated mice. Cancer research laboratories have genetically modified mice to breed animals with curly coats. They also have mice with naturally curled coats. All of the mice are used for cancer research. Curly coated mice have a difference in the lower dermis layers of the skin. They lack a gene which causes the tissues to produce a hormone called 'transforming growth factor alpha' TGF $\alpha$ . It has been hypothesised that all curly haired creatures may be TGF $\alpha$  deficient which causes the curly hair. There are far too many forms of the deficiency to write about here all of which may have different effects on the appearance of the hair. The one interesting fact that I found out was the effect of crossing known homozygous dominant curly gene carrying, curly coated animals with homozygous recessive curly coated animals. The two genes cancelled each other out and all of the resulting offspring were straight haired. If anyone was interested in research on curly hair perhaps this would be a good starting point. A test for the presence or absence of TGF $\alpha$  could be done. It would require skin biopsies from a number of horses and the kit to test for TGF $\alpha$  which is made in America and costs about \$500. I do not know for sure if the test kit will work on horses but possibly the manufacturer would know. If anyone wanted to do any reading on the topic any University library would have Cancer research or Cell Biology Journals which would have articles written on the topic. I don't think that genetically engineered curly horses would be a possibility as the mouse program cost in excess of three million dollars. Curly horse breeders will have to continue waiting in expectation for the arrival of their babies. Anyway I must close off now

Yours sincerely

*Patricia Skinner*  
 Patricia Skinner.





SPANISH - M S XI CENTURY



CHAMAN LUCAS GRANACH. 1472 - 1553

## Chinese



OUT OF THE PAST ♦ INTO THE FUTURE

The Masking of the Middle Ages

written and illustrated by Stephanie Lile

PO Box 3255  
919 Harborview, Washington 98335  
Originally published in  
The Morgan Horse, May 1986  
206 88 6311



THE SEVEN-CENTURY STRETCH that is lumped under the label 'Middle Ages' evokes images of Gothic cathedrals and conical helmets. Stories of King Arthur and Robin Hood chime in our minds, yet silhouetted above it all is the knight—a symbol from the period when strength and honor was foremost and literacy an afterthought.

Due to that afterthought, little is known about the training of Medieval horses. History reveals, however, that without the discovery and European adoption of the curb bit, stirrup and general use of cavalry, the path of the later Renaissance in classical equitation would never have been paved.

Our images of Medieval knights in full armor come to us from the very end of the period, those of the beginning being less idealized and more in the form of a common foot soldier. From the work of Miklos Jankovich we see that the cavalry idea spread from East to West, taking firm root in France by 700 A.D. Symbols of the era, the knight and the destrier, were well on their way to realization by the time the Normans and the Brits met in the Battle of Hastings (beginning about 1066). England had yet to accept full use of the bow and arrow, not to mention the horse, in battle, but time and pressure from the continent caused the Medieval ideal to take hold.

THE TIME is about 1350: the place, a castle on France's Seine river. The character is a man vital to the intricate workings of the feudal system. Visit him and let him speak . . .

(continued on next page)

— USDJ BULLETIN / Vol. XIV, Issue 4 / 1987 —

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<http://curlyhorsehistory.weebly.com/docs-i.html>

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Jan Becker  
Rt 2 Box 96  
Somerville Tenn  
38068

The American Bashkir Curly  
Registry

I read your article  
in Mother Earth. I have  
a story for you about  
the Curly's. In a book  
Mysteries of the West or  
5 strange Mysteries of the  
West I am not sure of  
the title. It told about  
Peg Leg Smith of the  
famed lost Peg Leg Smith  
lost mine in Cal. or  
Arizona. Peg Leg it  
seems become a horse  
thief he would steal



Horses in Calif. and drive them east to Kansas or Colorado, and sell them to immigrants headed to Calif. His favorite horse was a curly coated horse that he said could run as fast or faster than most horses and had more endurance than any regular horse. General of his wife's ~~house~~<sup>rode</sup> curly coated horses also. The time was some time after the gold rush but before you first redgentured sightings in 1898. Peg leg was dead at that time I think I think the time was



Around 1853 this was going on.

The other reason I wrote is I want one of these horses, a coat weaned preferable. I am a professional dog trainer and I need calm horses to ride I ride every day and I need a calm horse with endurance to spair. Until now I did not know where to get one or at least find out about them. Please send me all information on the Curly's, Locations of some of these horses.

Prefable some near by  
I think these horses would  
be perfect for me.

I realize there might  
not be any near by  
but please send me  
several locations.

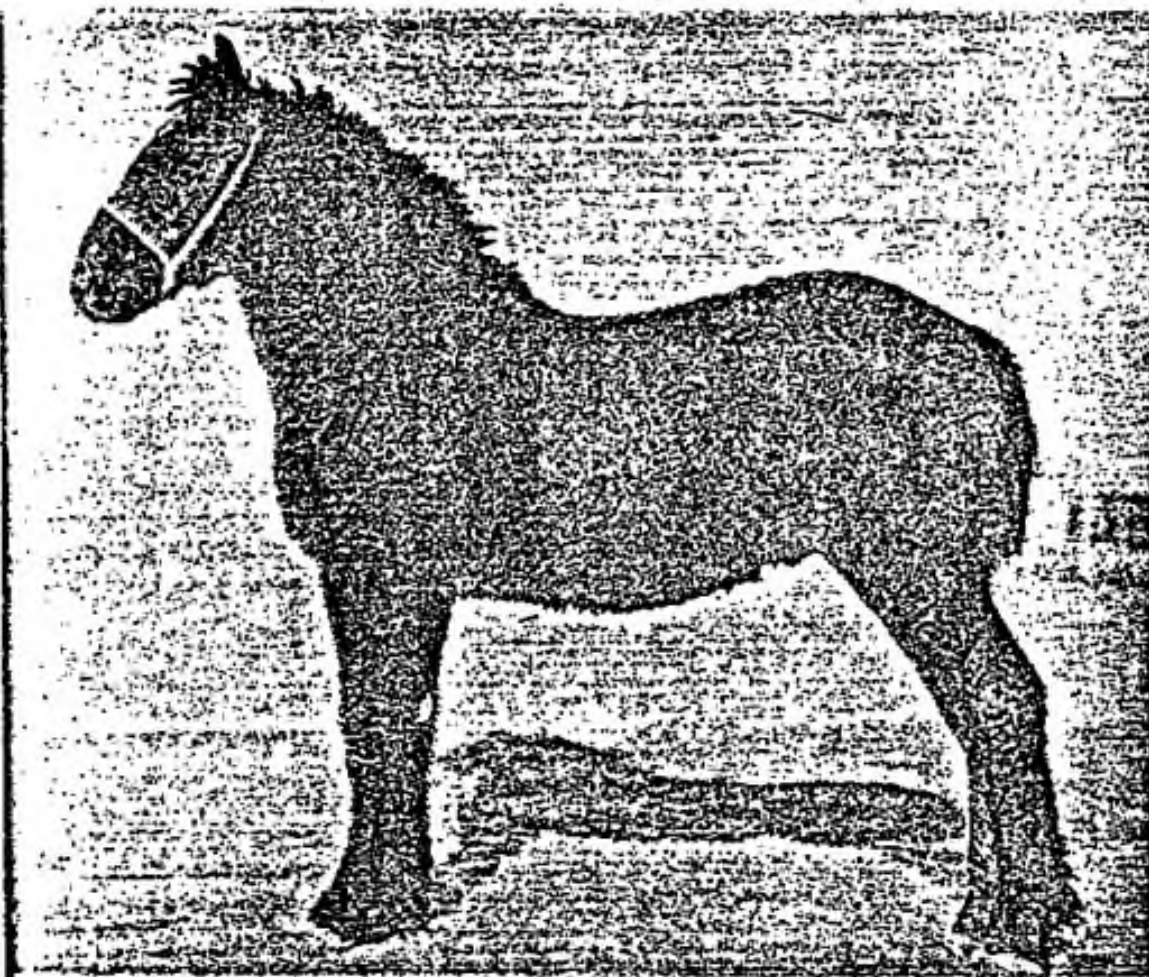
Please send as much  
information as you can

Sincerely

Dan Bicker

11-27-82  
O





### YEARLING CURLY-COAT

Figure 7

sixteen related Percheron mares have produced 42 colts, of which five have had curly. A study of the relationship of these mares and of the gene-frequency expectations indicates a recessive gene is responsible for this variation. The colt shown here is Colonel Laet 9, whose pedigree is given in Figure 9.

THE occurrence of curly hair coat in domestic animals is very uncommon. This condition, however, has economic importance especially in bred animals, since it is abnormal and may detract from their value as breeders.

Boyd<sup>3</sup> reported a condition called

"woolly hair" in swine which according to his description appears similar to the curly coat of horses. He states that: "six matings consisting of four outcrosses, one back-cross and one brother-sister mating indicate that woolly hair condition in swine is due to a single mendelian factor completely dominant over

Journal article number 483 new series of the Michigan Agricultural Experiment Station, Lansing, Michigan. Data for this paper were taken from a thesis submitted by the senior author to the Graduate School of Michigan State College.

Research Assistant in Animal Husbandry, Research Associate in Animal Husbandry, and Professor of Zoology respectively.



normal straight hair, the recessive condition."

Cole<sup>1</sup> reported a defective condition of hair and teeth in a herd of Wisconsin, Holstein-Friesian cattle. He suggests that this defect might be attributed to a genetic cause rather than to factors of the environment or to faulty nutrition.

Craft and Blizzard<sup>2</sup> describe in cattle a semi-hairless condition which is also curly in appearance. These workers state: "Experimental matings substantiate the suggestion that the semi-hairless condition is a hereditary recessive character."

Recently the work of Shchekin and Kalaev<sup>4</sup> has come to the attention of the authors. The abstract which follows is in line with the author's conclusions:

It was observed that curly coat is frequently met with in Lokai horses, among which its incidence is estimated at about three per cent. Experiments were made in a stud of Lokais at Stalinabad during 1934-37. Matings of curly animals gave 46 curly : 13 normal, and of curly  $\times$  normal, 17 curly : 20 normal. It may be concluded that curliness is caused by a single recessive gene. There is no sex-linkage and coat color plays no part. About 1/3 of curly offspring from matings of curly parents show a more marked degree of curliness at birth, and it is thought that these may be homozygotes. The difference disappears later.

#### Occurrence of Curly Coat in Horses

On March 27, 1931, a colt was foaled by a grey Percheron mare, Colene 191001, owned by the Michigan State College. This foal was sired by Sir Laet 190277, but did not live. The foal seemed normal in all respects, but possessed a very curly type of hair coat over the entire body. Little attention was given to this peculiar condition, except to note the peculiarity in the foaling records. The following year on April 7, 1932, Colene again foaled another colt sired by Sir Laet; this also had curly hair. This colt (Figure 7) developed into a good stallion, and was registered as Colonel Laet 207619. He was sold in 1933 to a purebred Percheron breeder who still has him in use as a herd sire. As far as the writers can determine, no curly foals have been sired by this stallion. Two days after Colonel Laet was



COLONEL LAET AS A FOAL

Figure 8

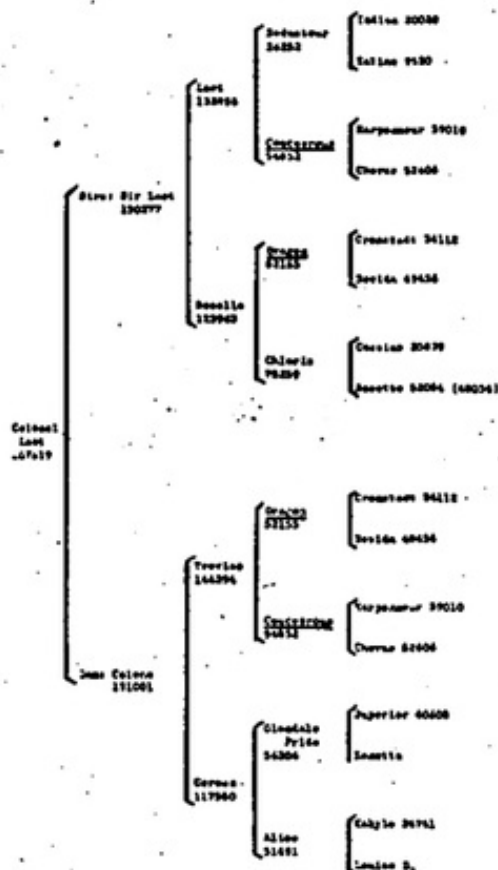
The curly coat can be readily identified shortly after birth and persists apparently through life.

foaled, a curly-coated filly was foaled by Queen Eagle 202035. This filly, later registered as Queenet 208683, was also sired by Sir Laet. Exactly a year later, on April 9, 1933, a full-sister of Colene's, Coro 197515, foaled a colt with a curly coat. Again the sire was Sir Laet. The animals whose mating produced these curly-coated young were related through several ancestors as shown in the accompanying pedigree. All of the dams who produced curly foals were sired by Treviso 144394 (a half-brother of Sir Laet's sire), or were of Treviso breeding. The interrelations of these pedigrees strongly suggested that curly coat is a recessive brought out by inbreeding.

Since 1933, four other curly foals, one male and three females, have appeared. All are of the same ancestry as the first four. In the curly animals numbered 6 and 7, we find a slight difference in the parentage. No. 6 is out of a mare whose dam was by Treviso, though the sire is Sir Laet. Curly filly No. 7 is sired by

## Blakeslee et al: Curly Horses

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## PEDIGREE OF COLONEL LAET

Figure 9

There is inbreeding to two ancestors, Couceorous and Dragon. Since Dragon's daughter, Roselle, had a slightly curly coat, it is probable that the gene is transmitted through him rather than through Couceorous.

a son of Sir Laet and out of a granddaughter of Treviso. No. 8 filly is out of a daughter of Treviso and by a son of Sir Laet. The ancestry of these animals and the fact that no other curly-coated individuals are known, gives further proof that the Sir Laet × Treviso cross is responsible for the appearance of this genetic anomaly. If we accept this as true, then from what common ancestor and in what manner is this curly coat inherited?

In an effort to answer the foregoing questions, the writers obtained data on all available mares which were sired by Treviso or by sons of Treviso and bred

back to Sir Laet. This survey, when summarized, involved 28 mares. Sixteen of these daughters of Treviso had 42 foals whose sire was Sir Laet. (Table I.) Of these 42 foals, 5 were curly-coated and 37 smooth-coated. Assuming that Treviso is heterozygous for the recessive curly factor, then 50 per cent of his daughters would be heterozygous for the same factor; and the other half would be homozygous for smooth hair coat. Mating Sir Laet, also heterozygous for curly, to these daughters of Treviso should result in one-eighth of the 42 offspring being homozygous curly, one-half heterozygous curly, and three-eighths, homozygous smooth haired. On this basis, the expected ratio would be 36.75 smooth-coated foals and 5.25 curly-coated foals. The actual ratio was 37 to 5 or the closest possible approach to the numbers expected to make a perfect ratio.

An examination of all pedigrees, all of which are similar to that of Colonel Laet 207619 (Figure 9), reveals that

TABLE I. Curly and Smooth Foals of Similar Breeding

Mares by Treviso	Foals by Sir Laet
Colene 191001	{ 2 curly males #1 & #2† 3 normal foals, (2 males, 1 female)
Cole 194276	3 normal males
Coro 197515	{ 3 normal males 1 curly male, #4
Treva 203692	{ 1 normal female 1 normal male
Maroline 196806	4 normal females
Claudette 212940*	1 curly female, #6
Marge 216012	1 curly male, #5
Clauro 191003	1 curly female, #8†
Allia 196831	2 normal foals
Maroline 196806	4 normal males
Fashion 182195	2 normal foals
Ota 199923	1 normal foal
Doritea 199930	{ 1 normal male 2 normal females
Lady Koncareleviso 213435	1 curly female, #7
Trevaret 195875	1 normal male
Leina 200584	4 normal foals
Leola 191002	{ 4 normal females 1 normal male
Queen Eagle 202035	1 curly female, #3

\*These mares are of Treviso breeding, but not by Treviso.

†These foals are by a son of Sir Laet.

‡Reference numbers.



Leonard H. Blakeslee, R. S. Hudson and H. R. Hunt - date 1943

191027 On March 27, 1931, a colt was foaled by a grey Percheron mare, Colene 190277, owned by the Michigan State College. This foal was sired by Sir Laet 190277, but did not live. The foal seemed normal in all respects, but possessed a very curly type of hair coat over the entire body. Little attention was given to this peculiarity in the foaling records. The following year on April 7, 1932, Colene again foaled another colt sired by Sir Laet; this also had curly hair. This colt (Figure 7) developed into a good stallion, and was registered as Colonel Laet 207619. He was sold in 1933 to a purebred Percheron breeder who still has him in use as a herd sire. As far as the writers can determine, no curly foals have been sired by this stallion. Two days after Colonel Laet was foaled, a curly-coated filly was foaled by Queen Eagle 202035. This filly, later registered as Queenet 208683, was also sired by Sir Laet. Exactly a year later, on April 9, 1933, a full-sister of Colene's, Coro 197515, foaled a colt with a curly coat. Again the sire was Sir Laet. The animals whose mating produced these curly-coated young were related through several ancestors as shown in the accompanying pedigree. All of the dams who produced curly foals were sired by Treviso 144394 (a half-brother of Sir Laet's sire) or were of Treviso breeding. The interrelations of these pedigrees strongly suggested that curly coat is recessive brought out by inbreeding.

Since 1933, four other curly foals, one male and three females, have appeared. All are of the same ancestry as the first four. In the curly animals numbered 6 & 7 we find a slight difference in the parentage. No. 6 is out of a mare whose dam was by Treviso, though the sire is Sir Laet. Curly filly No. 7 is sired by a son of Sir Laet and out of a granddaughter of Treviso. No. 8 filly is out of a daughter of Treviso and by a son of Sir Laet. The ancestry of these animals and the fact that no other curly-coated individuals are known, gives further proof that the Sir Laet X Treviso cross is responsible for the appearance of this genetic anomaly. If we accept this as true, then from what common ancestor and in what manner in this curly coat inherited?

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An examination of all pedigrees, all of which are similar to that of Colonel Laet 207619, reveals that there are two common ancestors in the pedigree of Sir Laet and Treviso. One is Dragon 52155, who was the sire of Treviso and also the sire of Sir Laet's dam, Rozelle 123963. The other is Couceorous 94852, who was the dam of Treviso and also the dam of Sir Laet's sire, Laet 133886. Correspondence with caretakers and owners of these individuals revealed that Rozelle, the dam of Sir Laet, possessed a slightly curly coat. Her fore-top, mane and tail were always especially curly.

This information convinces the writers that the curly coat factor is inherited through the common ancestor Dragon. Couceorous, the other common ancestor, apparently is not a carrier of the curly factor since her son, Laet, was mated five or more times to Rozelle. All of the foals have had straight hair, as far as the writer can determine.



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### Summary

In this study 16 purebred Percheron mares sired by Treviso 144394 and bred to Sir Laet 190277 bore 42 foals, of whom five possessed curly coats.

This curly coated condition, according to present information, is inherited as a mendelian recessive.

The common ancestor who apparently carried the curly coat gene was Dragon 52155, the sire of Treviso 144394 and grandsire of Sir Laet 190277.

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### The Immortal Paramecium

An animal that has produced 21,000 generations of offspring and yet is still alive is celebrating its 35th anniversary in the Osborn Zoological Laboratory of Yale University.

The animal in question is of a race of the microscopic water-dweller known as paramecium or slipper-animalcule. Because this particular race was started on its career of biological immortality by Prof. Lorande Loss Woodruff, it has come to be known as the Woodruff race.

Paramecium is able to reproduce itself indefinitely by simply dividing in two, without any sex process. Each of the two parts rapidly grows again to original size, so that each can claim to be the original individual; also, barring accidents, this continuously dividing-and-multiplying individual never dies. So that we arrive at the paradoxical situation of having millions of microscopic animals, each with as

good a claim as any of the others of being the founder of the line, and all of them 21,000 generations old without having experienced death.

Of course, the great majority of the offspring of the Woodruff paramecium race have been discarded and destroyed. If all had been kept, and food enough could have been provided, the race would in the first five years have packed all known space, out to the farthest stars, with a solid mass of paramecia.

This race of microorganisms has passed through 21,000 of its generations in little more than the time reckoned as one human generation. In human terms, 21,000 generations would be 630,000 years—a period going back to the haziest conjectural beginnings of the most primitive prehistoric human beings.—*Science News Letter*.

### Capital Investment

Improvements in heredity are permanent and each generation stands on the shoulders of the preceding one, whereas improvements in the environment produce almost their full effect on the animals for which they are first made. Each new generation must again receive the improved environment or the gain will be lost. Hence, in the long run it may be profitable to spend considerable effort to make small improvements in heredity, since the expense of making such improvements in one generation may yield in dividends for many generations. The expense of making improvements in heredity (so far as those are additive) is a capital investment; the expense of making improvements in environment is an operating expense. Naturally the breeder will wish to do both so far as they are profitable.—LUSH, J. L. *Animal Breeding Plans*, pp. 93-94.

In this study 16 purebred Percheron mares sired by Treviso 144394 and bred to Sir Laet 190277 bore 42 foals, of whom five possessed curly coats.

This curly-coated condition, according to present information, is inherited as a mendelian recessive.

The common ancestor who apparently carried the curly coat gene was Dragon 52155, the sire of Treviso 144394 and grandsire of Sir Laet 190277.

#### CURLY AND SMOOTH FOALS OF SIMILAR BREEDING

MARES BY TREVISO	FOALS BY SIR LAET
Colene 191001	( 2 curly males #1 & #2 ( 2 normal foals, 2 males, 1 female
Cole 194276	( 3 normal males
Coro 197515	( 1 curly male #4, 3 normal males
Treva 203692	( 1 normal female, 1 normal male
Maroline 196806	( 4 normal females, 4 normal males
Claudette 222940 *	( 1 curly female #6
Marge 216012	( 1 curly male #5
Claire 191003	( 1 curly female #8 (by son of Sir Laet)
Allia 196831	( 2 normal foals
Fashion 182195	( 2 normal foals
Ota 199928	( 1 normal foal
Doritea 199930	( 1 normal male, 2 normal females
Lady Koncarcleviso 213435	( 1 curly female #7
Trevaret 195875	( 1 normal male
Leina 200584	( 4 normal foals
Leola 191002	( 4 normal females, 1 normal male
Queen Eagle 202035	( 1 curly female #3

( \* This mare of Treviso breeding, but not by Treviso

The numbers of the curly foals are for reference only.

*from "Fruit and Vegetables for Horses",  
Horn and Workshop, 1939*

**Lemon Sour.**—  
Lemon syrup..... 12 drachms  
Juice of one lemon.  
One egg.

**Raspberry Sour.**—  
Raspberry syrup..... 12 drachms  
One egg.  
Juice of one lemon.

**Yama.**—  
One egg.  
Cream..... 2 ounces  
Sugar..... 2 teaspoonfuls  
Jamaica rum..... 3 ounce

Shake well, put into cup, and add hot water. Serve with whipped cream, and sprinkle mace on top.

**Prairie Oyster.**—  
Cider vinegar..... 2 ounces  
One egg.

Put vinegar into glass, and break into it the egg. Season with salt and pepper. Serve without mixing.

**Fruit Frappé.**—  
Granulated gelatin... 1 ounce  
Juice of six lemons.  
Beaten whites of two eggs.  
Water..... 5 quarts  
Syrup..... 1 quart  
Maraschino cherries. 8 ounces  
Sliced peach..... 4 ounces  
Sliced pineapple.... 4 ounces  
Whole strawberries... 4 ounces  
Sliced orange..... 4 ounces

Dissolve the gelatin in 1 quart boiling hot water; add the syrup and the balance of the water; add the whites of the eggs and lemon juice.

**KOUMISS.**  
The original koumiss is the Russian, made from mare's milk, while that produced in this country and other parts of Europe is usually, probably always, made from cow's milk. For this reason there is a difference in the preparation which may or may not be of consequence. It has been asserted that the ferment used in Russia differs from ordinary yeast, but this has not been established.

In an article on this subject, contributed by D. H. Davies to the *Pharmaceutical Journal and Transactions*, it is pointed out that mare's milk contains less casein and fatty matter than cow's milk, and he states that it is "therefore far more easy of digestion." He thinks that cow's milk yields a better preparation when diluted with water to reduce the percentage of casein, etc. He proposes the following formula:

Fresh milk..... 12 ounces  
Water..... 4 ounces  
Brown sugar..... 150 grains  
Compressed yeast.... 24 grains  
Milk sugar..... 8 drachms

Dissolve the milk sugar in the water, add to the milk, rub the yeast and brown sugar down in a mortar with a little of the mixture, then strain into the other portion.

Strong bottles are very essential, champagne bottles being frequently used, and the corks should fit tightly; in fact, it is almost necessary to use a bottling machine for the purpose, and once the cork is properly fixed it should be wired down. Many failures have resulted because the corks did not fit properly, the result being that the carbon dioxide escaped as formed and left a worthless preparation. It is further necessary to keep the preparation at a moderate temperature, and to be sure that the article is properly finished the operator should gently shake the bottles each day for about 10 minutes to prevent the clotting of the casein. It is well to take the precaution of rolling a cloth around the bottle during the shaking process, as the amount of gas generated is great, and should the bottle be weak it might explode.

Kogelman says that if 1 volume of buttermilk be mixed with 1 or 2 volumes of sweet milk, in a short time lively fermentation sets in, and in about 3 days the work is completed. This, according to the author, produces a wine-scented fluid, rich in alcohol, carbon dioxide, lactic acid, and casein, which, according to all investigations yet made, is identical with koumiss. The following practical hints are given for the production of a good article: The sweet milk used should not be entirely freed from cream; the bottles should be of strong glass; the fermenting milk must be industriously shaken by the operator at least 3 times a day, and then the cork put in firmly, so that the fluid will become well charged with carbon-dioxide gas; the bottles must be daily opened and at least twice each day brought nearly to a horizontal position, in order to allow the carbon dioxide to escape and air to enter; otherwise fermentation rapidly ceases. If a drink is desired strong in carbonic acid, the bottles, toward the end of fermentation, should be placed with the necks down. In order to ferment a fresh quantity of milk, simply add  $\frac{1}{2}$  of its volume of either actively fermenting or freshly fermented milk. The temperature should be from 60° to 60° F., about 60° being the most favorable.

Here are some miscellaneous formulas:

I.—Fill a quart champagne bottle up to the neck with pure milk; add 2 tablespoonfuls of white sugar, after dissolving the same in a little water over a hot fire; add also a quarter of a 2-cent cake of compressed yeast. Then tie the cork in the bottle securely, and shake the mixture well; place it in a room of the temperature of 50° to 95° F. for 6 hours, and finally in the ice box over night. Handle wrapped in a towel as protection if the bottle should burst. Be sure that the milk is pure, that the bottle is sound, that the yeast is fresh, to open the mixture in the morning with great care, on account of its effervescent properties; and be sure not to drink it at all if there is any curdle or thickening part resembling cheese, as this indicates that the fermentation has been prolonged beyond the proper time.

II.—Dilute the milk with  $\frac{1}{2}$  part of hot water, and while still tepid add it of very sour (but otherwise good) buttermilk. Put it into a wide jug, cover with a clean cloth, and let stand in a warmish place (about 75° F.) for 24 hours; stir up well, and leave for another 24 hours. Then beat thoroughly together, and pour from jug to jug till perfectly smooth and creamy. It is now "still" koumiss, and may be drunk at once. To make it sparkling, which is generally preferred, put it into champagne or soda-water bottles; do not quite fill them, secure the corks well, and lay them in a cool cellar. It will then keep for 6 or 8 weeks, though it becomes increasingly acid. To mature some for drinking quickly, it is as well to keep a bottle or two to start with in some warmer place, and from time to time shake vigorously. With this treatment it should, in about 3 days, become sufficiently effervescent to spurt freely through a champagne tap, which must be used for drawing it off as required. Later on, when very frothy and acid it is more pleasant to drink if a little sweetened water (or milk and water) is first put into the glass. Shake the bottle, and hold it inverted well into the tumbler before turning the tap. Having made one lot of koumiss as above you can use some of that instead of buttermilk as a ferment for a second lot, and so on 5 or 6 times in succession; after which it will be found advisable to begin again as at first. Mare's milk is the best for koumiss; then cow's milk. Cow's milk may be made more like them by adding a little sugar of milk (or even loaf sugar) with the hot water before fermenting. But perhaps the chief drawback to cow's milk is that the cream separates permanently, whereas that of mare's milk will remix. Hence use partially skimmed milk; for if there is much cream it only forms little lumps of butter, which are apt to clog the tap, or are left behind in the bottle.

**Kwass.**—Kwass is a popular drink among the Russian population of Kunzev, prepared as follows: In a big kettle put from 13 to 15 quarts of water, and bring to a boil, and when in active ebullition pour in 500 grams of malt. Let boil for 20 minutes, remove from the fire, let cool down, and strain off. The liquid is now put into a clean keg or barrel, 30 grams (about an ounce) of best compressed yeast added along with about 600 grams (20 ounces) of sugar, and the cask is put in a warm place to ferment. As soon as bubbles of carbonic gas are detected on the surface of the liquid, it is a signal that the latter is ready for bottling. In each of the bottles, which should be strong and clean, put one big raisin, fill, cork, and wire down. The bottles should be placed on the side, and in the coolest place available—best, on ice. The liquor is ready for drinking in from 2 to 3 days, and is said to be most palatable.

**"Braga."**—Braga is a liquid of milky turbidity, resembling *caffé au lait* in color, and forming a considerable precipitate if left alone. When shaken it sparkles and a little gas escapes. Its taste is more or less acid, possessing a pleasant flavor.

About 35 parts of crushed millet, to which a little wheat flour is added, are placed in a large kettle. On this about 400 parts of water are poured. The mixture is stirred well and boiled for 3 hours. After setting for 1 hour the lost water is renewed and the boiling continued for another 10 hours. A viscous mass remains in the kettle, which substance is spread upon large tables to cool. After it is perfectly cool, it is stirred with water in a wooden trough and left to ferment for 8 hours. This pulp is sifted, mixed with a little water, and after an hour the braga is ready for sale. The taste is a little sweetish at first, but becomes more and more sourish in time. Fermentation begins only in the trough.

**WINTER BEVERAGES:**  
**Campello.**—Thoroughly beat the yolks of 12 fresh eggs with  $\frac{1}{2}$  pounds finely powdered, refined sugar, the juice



# From Emilie Kitteringham ① Jan., 1975

## ① Bashkirsky - Trotter, Non, Budyonny, Native Pony

Pony

Origin: Bashkiria, USSR

Height: 13.2 hands

Colour: Bay, dun or chestnut

Physique: thickset, prominent withers, longish back, low set tail and short legs.

Features: tough

Temperament: calm, good-tempered and hardy

Use: riding and pulling sleighs, mares are milked for human

## ② Russian Trotter - Orlov-trotter, Standardbred

Warmblood

Origin: USSR

Height: 15.3 hands

Colour: black, bay or chestnut

Physique: mixture of Orlov and Standardbred

Characteristics

Features: faster than the Orlov

Temperament: like the Orlov, active, bold and courageous

Use: trotting races.

## A ③ Orlov Trotter - Dutch Blood, Thoroughbred, Mecklenburg (East German Hanoverian)

Arab, Norfolk Trotter, Dutch Blood

Warmblood

Origin: USSR

Height: 16 hands

Colour: grey, black or bay

Physique: thickset, upright shoulder, broad chest, deep girth and long straight back.

Features: fast and active

Temperament: bold and courageous

Use: trotting races, riding, harness

## A ④ Standardbred - Thoroughbred, Canadian

## Turkoman cont

(3)

Height: 15.2 hands

Colour: solid

Physique: narrow chest, light but tough frame

Features: floating action and speed

Temperament: enduring

Use: foundation stock for other breeds, riding cavalry and racing.

The Turkoman in Central Asia is called Domud.

The Turkoman in Turkoman Steppes is called Akhal Teke.

## B © Karabakh - Persian, Turkoman, Arab

Warmblood

Origin: Karabakh mountains, Azerbaidzhan, USSR

Height: 14.2 hands

Colour: dun, bay or chestnut with metallic sheen

Physique: tough mountain horse with a small fine head, low set tail and good feet.

Features: ancient breed, energetic and tough

Temperament: active and sensible

Use: riding, equestrian games and racing

## B © Karabair - Mongolian, Arab

Warmblood

Origin: Uzbekistan USSR

Height: 15.2 hands

Colour: bay, chestnut, or grey

Physique: similar to the Arab, but stouter.

Two types - the saddle, which is fast and elegant and the harness, which is larger with a longer back.

Features: ancient mountain breed, tough and versatile

Temperament: sensible, brave, intelligent and responsive

Use: agricultural work, riding and local sports.

(4)

© Budyonny - Thoroughbred, Don, Kazakh Warmblood

Origin: USSR

Height: 15.3 hands

Colour: chestnut or bay with golden sheen

Physique: strong frame, crested neck, close-coupled and deep bodied

Features: fast and enduring

Temperament: intelligent, calm and energetic

Use: riding, competitions and steeplechasing

© Kazakh - Mongolian Wild Horse, Don Pony

Origin: Kazakh, USSR

Height: 13 hands

Color: bay chestnut or grey

Physique: similar to the Mongolian

Features: tough, some ponies amble rather than walk.

Temperament: willing and enduring

Use: riding and herding, milk and meat

② Mongolian Wild Horse - Foreign Stock, Asiatic Wild Horse (Asiatic Wild Horse, *equus przewalski poliakov*)

Origin: Mongolia

Height: 13.1 hands

Colour: black, brown, bay or dun

Physique: thickset, short coupled, good bone

Features: tough, frugal, great stamina, fast over short distances

Temperament: very enduring, brave

Use: work pony of nomadic tribes, mares provide milk for cheese and a drink called kumis.

The Mongolian in Japan is called Hokaido. The Mongolian in Tibet is called Native Tibetan. The Mongolian in India is called Spiti. The Mongolian in Indonesia is called Sumba.

The Mongolian Pony in India



(5)

③ Lokai - Mongolian, Arab, Donmud, Karabair

Warmblood

Origin: Uzbekistan USSR

Height: 14.3 hands

Colour: grey, bay, or chestnut often with golden tint

Physique: varies, but usually sturdy frame with tough hooves, hair may be curly.

Features: a strong, surefooted mountain horse

Temperament: tractable, willing and brave

Use: riding, pack, local equestrian sports

④ Novobirghiz - Kirghiz, Don, Thoroughbred

Warmblood

Origin: Kirghiz and Kazakhstan, USSR

Height: 15 hands

Colour: bay, chestnut or grey

Physique: long neck, long straight back, sloping croup, short legs

Features: tough, sure footed and frugal.

Temperament: strong and enduring

Use: mountain work - harness and saddle, provides milk.

(2)

## Standardbred Cont:

Warmblood

Temperament: bold, active

Origin: USA

brave and enduring

Height: 15.2 hands

Use: driving and

Colour: solid

racing

Physique: varies as it is bred for speed, usually muscular Thoroughbred type with longer back, short legs and powerful shoulders

Features: stamina, speed

n - Oriental, Thoroughbred, Orlov Trotter, Turkoman, arabakh, Karabair.

rmblood

gin: Central Asia (steppes)

ight: 15.2 hands

our: chestnut, bay or grey

physique: deep body, long straight neck and back, long legs  
 uses: versatile, rugged with great stamina.  
 temperament: energetic, calm and reliable  
 use: the original Cossack horse, now used for driving,  
 riding and long distance racing.

B @ Thoroughbred-Arab, Turk, Barb, Galloway

Origin: U.K.

Height: 16 hands

Colour: solid

Physique: varies from close-coupled sprinters  
 with large, powerful hindquarters to big-  
 framed, longer backed, big boned chasers, must  
 have an elegant head, long neck, sloping  
 shoulder, prominent wither and silky coat.

Features: fast and active.

Temperament: bold, brave and spirited

Use: racing, riding and improving other breeds.

B (b) Lurkoman - Mongol Horse & Scythian Horse

Warmblood

Origin: Iran

## HOW CHARACTERISTICS OF ANCIENT HORSE BREEDS AND

### THE AMERICAN BASHKIR COMPARES

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SUMMARY LETTER

What unique characteristics, if any, are manifest in ancient horse breeds that can distinguish them from modern breeds? Does the Bashkir display sufficient of these characteristics to be considered an ancient breed?

Examination of historical references shows that certain breeds of horses that were prevalent in ancient and medieval times are still existant today.

A study of physical and physiological features will show that features are retained in present day horses that help us determine their ancestry.

Geographic and climatic conditions will be shown to have influenced the development of the horse in days past from the flaring nostrils of the warm weather horse to coat and shape of facial bones of the cold weather horse.

We shall see how man has succeeded in some cases of developing a new breed and encountered total failure in others because he was apposing nature.

In summary, we shall note how the Bashkir breed meets many of the qualifications, but that a final and absolute conclusion will require additional research.

HOW CHARACTERISTICS OF ANCIENT HORSE BREEDS AND  
THE AMERICAN BASHKIR COMPARES

Historical records have left very few positive descriptions of horse breeds of days past. We can trace certain modern day breeds back one thousand, two thousand, and every three thousand years in a few isolated cases. Some breeds are the Arabian Barb of North Africa, Persian Arab, Turkoman, Akhal-Teke, and the Fjord pony of Norway.

Most authorities would agree that these are very old breeds, but would disagree as to their origin. Some would maintain that the Arabian, Barb, Persian Arab, Turkoman, and Akhal-Teke are all off-shoots of the same breed, while others would say they came from different sources.

Past records prove to be both contradictory and ambiguous. Examples of this are:

1. Equestrian figures in the frieze of the Parthenon, era fifth century B.C.
2. Old pedigree Seal 105F found in Persia with carvings of various horse head profiles. Depicted amongst these are definite concave profiles which we associate with the modern Arabian horse, era 3000 B.C.

These will suffice to show our point. Example one depicts horses that have the appearance of the Prjevalski or Mongolian wild pony (the last living truly wild horse), and example two from 2500 years earlier, shows horses that appear to have fairly modern characteristics. Both of the findings come from the Mediterranean area. So history cannot be used as a positive factor, but only as reference.

Physical or physiological attributes would seem to be more positive and definite in determining a breed character. This can be seen in the modern day thoroughbred horse which has been over three hundred years in the making, and is still improving under the guidance of man. How much longer would it have taken ten or fifteen centuries ago?

Certain features which are unique to horses of certain breeds and/or areas are: The absence of hind chestnuts is a frequent occurrence among the horses and ponies of Northern Africa, although they are almost always present in ordinary breeds. Professor Ewart has reported about 10 percent of the ponies in certain districts of Iceland have no hind chestnuts. Ergots, though generally present in most breeds, are reported by Professor Ewart to be absent in many Connemara, Hebrician, and Iceland ponies. Ergots are also frequently missing in purebred Arab and thoroughbred horses.

Another physical feature which is usually an indicator of ancient breeding is a certain color and marking pattern, such as found in the Norwegian Dun with bars or strips of a darker shade, horizontal on the legs, vertical on the shoulders, a strip down the back line, and some finer lines on the face.

Geographic or climatic induced features will usually manifest themselves in physical or physiological changes. In the Arab and most other Middle East breeds, we see this in the very fine but short hair coat, a very strong desire to carry the tail away from the body, an ability to go longer periods without



water, the flaring of the nostrils to accept more air, and a clean non-restrive throat latch allowing air to flow freely to the lungs.

Horses from colder climates will show many features that are opposite to that of the hot weather horses. Their nostrils will be smaller. The facial bones will be convex rather than concave. The tail is carried tight to the body. Their hair covering will be longer, and will frequently grow a under coat during the coldest portion of the year.

The Middle East horse is trying to disipate heat, the cold weather horse is conserving body heat. These features have evolved only after hundreds and even thousands of years of exposure to their unique climatic conditions.

Man has met with mixed success in trying to change the characteristics of existing breeds of horses. Poor results have been obtained when trying to introduce some Arab features into another breed that has existed for centuries in a cold climate. The only survivors of such a breeding program were those offspring that carried the features of the resident parents, and those having Arab features would perish. On the other hand, spectacular results were achieved in the development of the English thoroughbred. This also was the result of Arab and native horses being crossed, however, there was no climatic or other outside forces working against the desired objective and a horse superior to either of the parents, relative to speed, was the result.

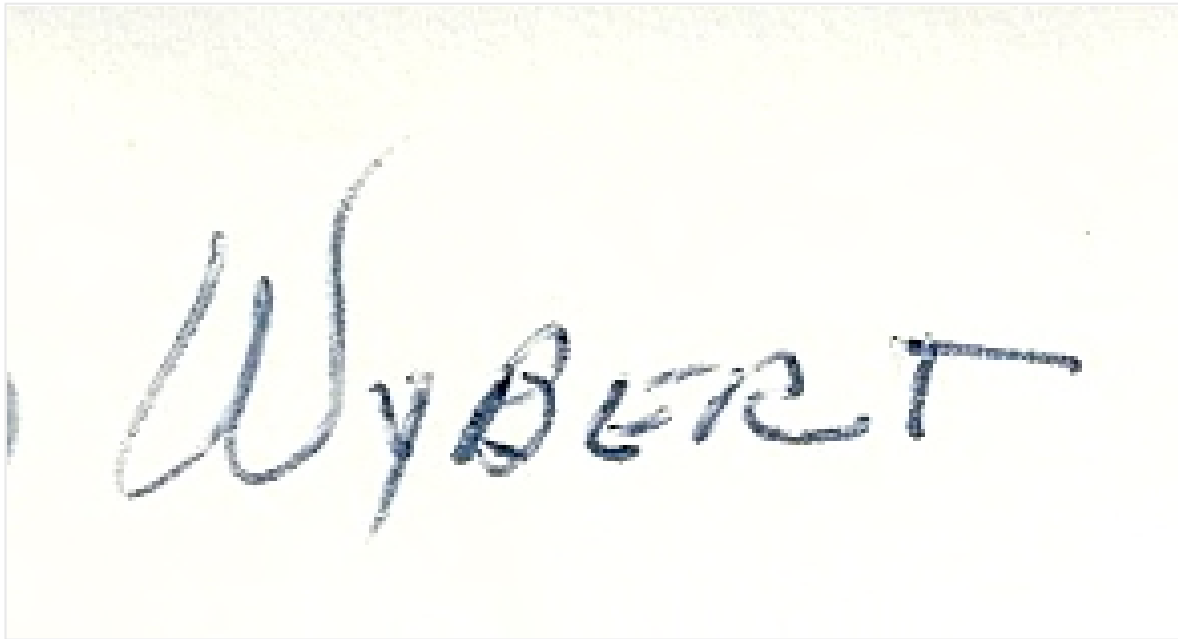
How does the Bashkir breed compare to those features outlined above? History tells us that the Bashkir is a result of crossing Mongolian ponies, brought into Southern Russia by the Mongolian hordes from the South, and the Norwegian Pony (Fjord) from the North. The Bashkir does have a heavier than normal coat, thicker and longer, growing to a length of 4-6 inches during Winter. It has chestnuts on all four legs, but very rarely has ergots. Its nostrils are generally smaller, but not to the extreme of some very cold climate horses, and it tends to have convex (roman nose) facial bones. It has been reported by endurance riders that the Bashkir can sustain a higher pulse rate, without ill effects, than is considered wise or safe for most breeds.

A preliminary conclusion would indicate that the Bashkir would qualify as an ancient breed, but final and positive proof would involve X-ray of bone structures and analysis of blood proteins to determine a final disposition.

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A handwritten signature in blue ink on a piece of aged, yellowish paper. The signature reads "WyBERT" in a cursive, slightly stylized font. The "W" is large and loops around the "y". The "B" is also large and loops around the "E". The "T" is simple and ends with a horizontal stroke. The paper has a slightly textured appearance with some minor discoloration and a small dark speck near the top right.

# INTERPRETATION OF PULSE AND RESPIRATION AS A MEASURE OF CONDITION

BY  
B.C. THROGMORTON, D.V.M.

The data presented here was collected during the Thousand Oaks North American Trail Ride Conference (NATRC) Competitive Trail Ride in June of 1968. This was an excellent ride to use as an example; because the competitive horses fell into three distinct groups: well conditioned, slightly conditioned and poorly conditioned. There were some difficult climbs which caused adequate stress and made the recovery rates meaningful. Without adequate stress P/R recovery rates will not clearly distinguish between the well conditioned and poorly conditioned horse.

A common error made by many who judge condition by P/R rates is that only one reading is taken: The initial reading. This initial reading alone does not indicate which horse is better conditioned. Without a recovery reading being taken the initial reading has no meaning. It has now been established that the recovery from a given stress not only varies with condition but with other factors as well. One of these factors is the duration of the rest period. Rest time, as we refer to it here, relates to the time span during which the recovery is taken. The preferred time span will vary with each judge; however, the most commonly used time span for recovery has been 30 minutes. However, it will be shown that this time span is too long to accurately differentiate the well conditioned trail horse from the unconditioned horse when the stress is inadequate.

We can state as condition improves the initial readings for any measured exertion will become lower. As an example, let us take a horse that climbs 1000 feet at a 10 degree grade at a slow trot. This is equivalent to climbing 1000 feet in one mile. The initial readings when the horse reaches its destination will be highest for the unconditioned horse. As the horse becomes conditioned, if he is made to travel this same course at the same rate of speed, the initial readings of P/R on arrival will be lower by an amount which is related to its condition. In effect, the well conditioned horse has now developed the mechanism to handle a portion of its stress enroute. This fact often leads to misinterpretation of P/R readings. It is felt that the horse with the lowest initial readings has developed the best condition. This is not so. It is true, as stated earlier, that as condition improves the initial readings are lower but other factors have a far greater effect on the initial reading than condition alone. The initial reading should be interpreted as being a reflection of the extent of exertion just prior to the taking of the readings and nothing more.

It must be understood that high initial readings do not demonstrate a lack of condition. Even the best conditioned horse can be made to have high initial readings if the rider forces it to work excessively just prior to the check point. Look at horses (1) and (2) in the chart and note that, no matter what the initial readings, these two horses approached normal readings in as short a time as 5 minutes. The point to be made here is that it is not the initial reading that is important but rather how quickly the P/R readings approach the accepted normal.

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The P/R rates are changing constantly, whether the horse is moving or standing still. For this reason it is of utmost importance that initial readings be taken immediately when a horse arrives at a check point; for a well conditioned horse will recover as quickly at a slow walk as it will standing still. Walking in a circle at a slow walk serves no useful purpose other than to bore the rider and his horse. To be meaningful the recovery period must be precisely the same for all horses. This is the only way relative values may be obtained.

Let us now discuss what is the normal. I consider a horse to have two different normal readings. The first is for a horse at complete rest. Example: At night in a stall or tied to the fence, completely quiet. The second is for a horse at rest but with unusual commotion. Example: In the morning while being fed, horses moving about, etc. This second normal is the one most commonly quoted in the text books. Thus we arrive at two normals:

First:

At Complete Rest	Heart Rate	28 to 40
	Respiration	6 to 16

Second:

Normal Arousal	Heart Rate	32 to 48
	Respiration	16 to 24

During examination calm horses tend to have lower readings and more excitable ones tend to have higher readings. It is interesting to note that this years Tevis Cup horses at the preliminary examination showed a normal range of heart rate of 36 to 60 and respiratory rate of 20 to 56. These horses tend to be a more excitable type of horse. However, it should be also noted that the normal readings were lower for the same group of horses after the days ride and exercise had a calming effect. For our purpose here we will consider the normal readings for a working horse to be: Heart Rate: 48 and Respiratory Rate: 16.

Having established 48 and 16 as normal, we can now look to the data chart for further information about recovery. In the first group it will be seen that each horse recovered well and approached our accepted normal at each check point regardless of allotted rest time. It can be seen, however, that the five minute rest recovery period is too short to clearly demonstrate a distinct difference between the best and worst conditioned horses. The fact is, it tends to favor the more poorly conditioned horses because they actually had in each case dropped considerably from their initial P/R reading. In order to make a full evaluation of the data, one must realize that the horses were on one of the easier parts of the trail when the 5 minute reading was taken. The horses were not tired at this time so they all started to recover very quickly. If the climb had been more difficult the poorly conditioned horses would not have recovered as rapidly as they did.

The 10 minute recovery time seems to be the most useful for judging condition as the better horses did return to their working normal within 10 minutes while the poorly conditioned horses did not.



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If we compare the recovery for 30 minutes it will be seen that most all the horses approached normal regardless of their state of condition. If recovery rates are to be used I feel the 10 to 15 minute recovery time interval is most meaningful. It was apparent from having watched the horses perform on this trail ride that the best correlation between the observed condition and the recovery time was for the 10 minute recovery.

Many judges place considerable emphasis on inversion of P/R readings. It should be stated here, that even the best conditioned horse can be inverted by over stressing at some point on the trail. A slight inversion in itself is not serious because one can create this situation by simply running a horse for a quarter mile. However, the horse that has consistent inversions of P/R's at every check point is obviously not in condition to make the ride at the pace the rider has set for him. Note that I said, "The pace the rider has set for him." An inversion does not mean lack of condition but rather it means the pace is too fast for the horses state of condition.

A more serious situation is one where the inversion ration is 1 : 2. It has been found in the past that consistent inversion of the nature of 1 : 2 or better is commonly associated with lack of condition or heart disease. It is obvious that a horse which has the ability to recover to normal in 10 minutes after a slight inversion is obviously not fatigued or out of condition. It means that the horse has had a stiff workout just prior to the check point.

Look at the first and second 10 minute recoveries for horse #2. Both initial readings were slightly inverted, however, both recovery readings approached normal in 10 minutes. In contrast note the 10 minute recoveries for all the horses in groups 2 and 3. These horses were not as well conditioned and were unable to alter their inversion state within the 10 minute rest period.

The first 10 minute recovery was taken at the top of the most difficult climb on the trail. All the 20 minute recovery readings were collected here because these horses were held an extra 10 minutes due to lack of recovery. Some horses in group 3 were still inverted after 20 minutes; however, they were allowed to continue the ride with a warning to slow the pace at which they were riding.

A very close study of the 30 minute recovery readings for all the horses listed will reveal that there is little difference between them. The only conclusion one can draw from this data is that the 30 minute recovery period is too long. On this ride all the horses had recovered within 30 minutes. A horse that has not recovered to normal 30 minutes is in serious trouble and is showing signs of impending fatigue.

In an earlier paper written by Dr. S.H. Roberts a ratio system was developed to aid in the interpretation of P/R readings. For those who are unfamiliar with this I will restate it.

	Heart	Respiration	Ratio	
Normal	48	12	4 : 1	
Light Work	60	30	2 : 1	
Medium Work	70	70	1 : 1	
Heavy Work	80	120	1 : 1.5	Inversions
Fatigue	80	160	1 : 2	"

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This system is adequate as a reference; however, it has its short comings. It fails to clarify the significance of inversions at various levels of stress. For example a 1 : 1 ratio with readings of 40 to 40 is not serious but a 1 : 1 ratio of 100 to 100 readings is serious and should be evaluated in this way. An inversion of 48 heart and 52 respiration is very mild and not serious; while an inversion of 90 to 94 is important. An Inversion of 90 to 140 is still more serious since the horse is showing extreme stress.

The type of errors of interpretation which are an integral part of any computerized ratio system are also likely to creep into any subjective interpretation. This is best illustrated by looking at the horses in Group 3 which actually had a higher percentage of recovery for the 5 minute recovery than for those horses in Group 1. The higher percentage of recovery is due to the high initial reading. The higher the initial reading for any given horse the greater the percentage of recovery during the early minutes of the recovery period. Knowing that the horses were not highly stressed at the time the 5 minute recovery was taken would help to account for the rapid recovery of Group 3 horses.

The horses had not been severely stressed at this point. Note that on subsequent recovery checks as fatigue manifested itself these horses were truly slow to recover. If we compare these same horses at their first 10 minute recovery we will discover that the recovery was not as good in group 3 because this was taken at the top of a very steep climb and many of the horses were heavily stressed at this point. Most of the horses in group 3 had to be held for 10 minutes extra to allow them to recover to the point where it was safe to continue.

It is interesting to note that all the horses in group 3 were being ridden by riders on their first NATRC ride. Another interesting point to note here is that the first 30 minute recovery was taken at the lunch stop about 1½ hours riding time after the first 10 minute recovery was taken. The horses of groups 2 and 3 were not completely recovered even after a 30 minute lunch stop. This is truly an indication that the horses were tired after the big climb. This is the one reading where all the horses show the expected recovery by group. Group 1 is the best, Group 2 is next and Group 3 is the poorest conditioned. It should be noted that all the other 30 minute readings were not useful for dividing the groups because they were taken on the second day of the ride and this was by far the easier of the two day ride. The second 10 minute recovery was taken on the second day at the top of a mild climb. While all the horses showed recovery, it is easy to see the distinct grouping is the same as before. Number 1 best, number 2 fair and number 3 poor.

As a general rule the respiratory rate is less reliable than the heart rate as a measure of condition. This is due to the fact that it has a greater range and is affected more by body temperature, outside air temperature and altitude. Also there is some variation in the type of respiratory movement in different horses. Some breathe shallow and rapid, while others breathe slow and deep. Don't allow the breathing style of a horse to confuse your thinking about its condition.

The respiratory rate will vary more also because it is more difficult to determine than the heart rate. The method of securing is likely to contribute to the error. Taking respiration by observing the flank is very easy and accurate if the horse will stand still during the observation period. Placing the hand in front of the nostril to feel the air expired is good but often leads to sniffing or head tossing on the part of the horse. The most accuracy is obtained by using a stethoscope on the trachea and listening to the air movement in the

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trachea. This method requires two stethoscopes or it more than doubles the time, since both heart and respiration are taken by the same individual.

#### SUMMARY

When P/R's are used to measure condition, paired readings must be taken. The readings must be taken quickly and accurately. Lay people should be used to take and record the P/R so that the judges can utilize their time in watching the horses and horsemen perform.

High initial readings do not necessarily indicate a lack of condition, nor do consistent low initial readings. They indicate the amount of stress or rate of work that was performed just prior to taking them.

The range of values for the accepted normal should be kept in mind and a pattern of recovery developed for each horse. At least 4-6 recovery readings should be taken on a two day ride.

The time span required for recovery will depend on the degree of stress. I would suggest the use of a 10 to 15 minute time span for spot checks on the trail and 30 minute recoveries where indicated to screen horses for impending fatigue.

Each ride should allot 30 minutes each day for spot checks and include this in their overall riding time.

This paper is presented with the hope that it will assist in standardization in the interpretation of P/R readings. The P/R reading is just one single objective measure of condition. There are many other criterion which are used to judge condition in competitive trail horses; thus, when P/R's are used they should be obtained and interpreted correctly or they should not be used at all.

Copies of this paper may be obtained by writing to:

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HORSE NO.	NORMAL READINGS	5 MINUTE RECOVERY	10 MINUTE RECOVERY	10 MINUTE RECOVERY	20 MINUTE RECOVERY	30 MINUTE RECOVERY	30 MINUTE RECOVERY	30 MINUTE READING	5 HOUR READING
GROUP 1									
1	H 36	54 48	66 42	102 48		66 42	54 36	36	42
	R 14	12 6	64 16	100 16		43 8	23 16	8	8
2	H 36	60 48	73 48	90 54		66 42	54 36	42	36
	R 16	36 20	68 16	96 20		36 16	40 20	12	12
3	H 42	72 60	72 54	84 54		78 42	66 48	42	48
	R 16	103 36	112 16	92 24		76 16	42 16	12	16
4	H 36	66 54	60 48	96 48		72 40	60 36	36	48
	R 20	84 54	68 24	64 24		92 12	32 20	8	16
GROUP 2									
5	H 36	72 54	102 66	96 54		90 54	102 54	54	42
	R 16	36 32	132 68	92 24		96 28	72 24	12	8
6	H 48	66 78	103 72	102 54		84 66	78 48	54	42
	R 16	102 66	122 76	116 28		116 24	80 16	8	8
7	H 42	92 66	84 60	96 54		102 54	72 48	48	42
	R 44	120 102	132 100	92 40		88 16	52 24	8	12
8	H 42	84 72	78 60	78 48		102 42	84 48	54	42
	R 20	72 66	128 88	104 72		108 24	72 32	12	12
GROUP 3									
9	H 42	78 72	96 72	78 72	96 66	84 66	72 48	48	48
	R 40	156 102	140 88	104 84	140 88	100 24	72 20	22	12
10	H 42	96 66	96 84	102 66	196 60	34 54	72 54	48	42
	R 32	116 78	144 140	108 64	144 104	112 24	56 20	12	20
11	H 48	96 54	84 78	34 54	84 66	84 66	78 54	48	48
	R 34	92 30	140 84	96 92	140 40	160 24	48 20	12	12
12	H 42	66 60	84 66	78 54	84 54	78 54	78 48	54	42
	R 30	140 60	150 120	120 56	150 72	100 64	68 24	12	12
13	H 48		84 78		84 84	"OUT THUMPS"		H=HEART	
	R 12		140 132		140 112			R=RESPIRATION	