

NEW RESEARCH SHEDS LIGHT ON AMERICAN SADDLEBRED ANCESTRY

Steve Gaw

In the last few years the use of DNA to trace the ancestry of humans has revolutionized research into genealogy, hereditary diseases, and anthropology. In human ancestry research we are now able to check the relationship of individuals with the same last name to verify whether it is the same family and estimate the relationship. Other exciting discoveries are being made as to the origin of mankind. Scientists have only recently learned that rather than having gone completely extinct Neanderthals are now believed to have interbred with our human ancestors. Neanderthal DNA actually inhabits nearly all people today who are not exclusively of Sub-Saharan ancestry. DNA research has also impacted the equine world and has become an important part of understanding hereditary diseases and characteristics as well as confirming the parentage of foals.

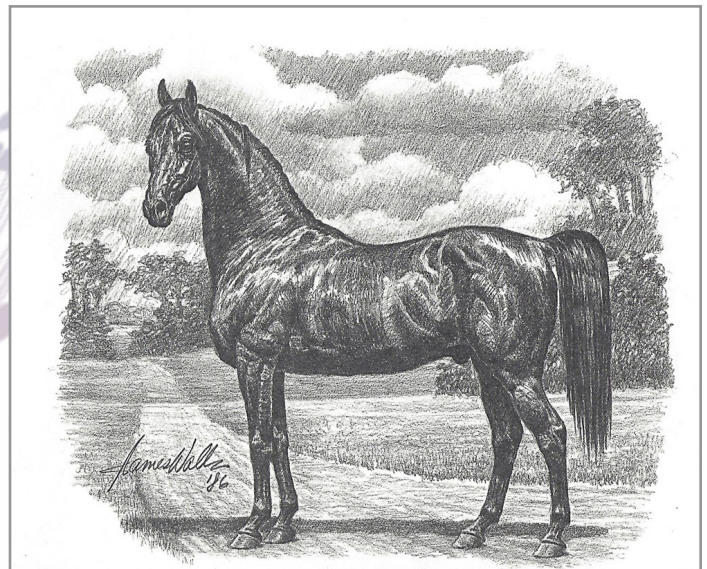
Recently, research has made significant inroads producing exciting new revelations into the origins of the modern horse. As a result of a new study by pioneers in this field of equine research, which included American Saddlebreds, we now have scientific evidence as to the origin of the sire lines in the breed.

The three Thoroughbred foundation sires: the Darley Arabian, Byerley Turk, and Godolphin Barb (or Arabian), forever changed many of the horse breeds in Europe and America after their arrival in England beginning in the late 17th Century. They added refinement, speed, and a strong propensity to trot. According to historical accounts, our Saddlebred sire lines were established by Denmark F.S., an American Thoroughbred stallion born in the first half of the 1800s tracing on the top side to the Byerley Turk; and Harrison Chief F.S., another Nineteenth Century stallion, a descendant of the Darley Arabian through Imported Messenger, the principle sire line of the American Standardbred breed. Until recently there was no known way to authenticate this ancestry, but new scientific breakthroughs in the study of DNA are changing that and providing us with evidence of the origin of today's horse breeds.



The Byerley Turk

The study of male line inheritance is done by analyzing the Y chromosome. Every male has a Y and an X chromosome. The Y chromosome is inherited from a male's father, which he inherited from his father and so on back through the years of time. By understanding the characteristics of a male's Y chromosome one can gain understanding of the Y chromosome characteristics of his male line ancestors. These characteristics inherited from an ancestor would be shared by other male line descendants of the same ancestor. Depending on the species, the characteristics of the Y chromosome in animals can have substantial variation from one to another or in some cases very little. The more variation within Y chromosomes in males of an animal type (such as dogs or horses) the easier it is to distinguish between different male line families. The more uniform the more difficult it is. In the equine world scientists had found that there is very little diversity in the Y chromosome of horses. In fact, prior to the current decade, there

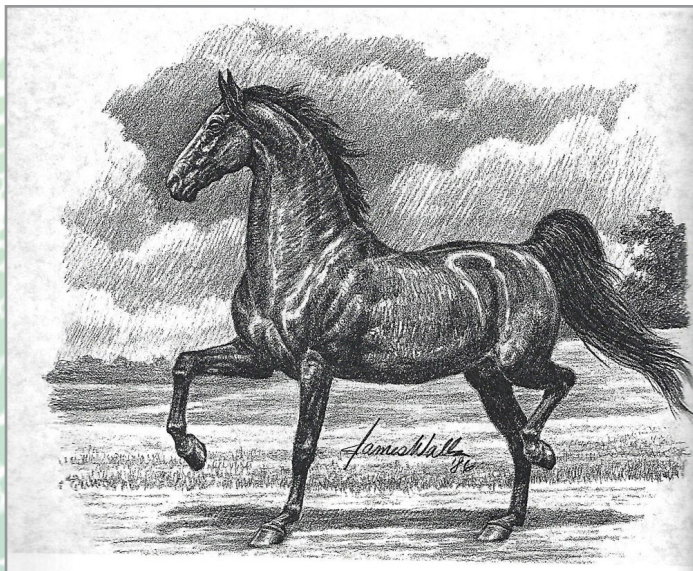


Denmark F.S.

was no known way to distinguish different sire lines. One of the best known ongoing equine DNA research efforts into equine ancestry has been led by Dr. Barbara Wallner at the University of Veterinary Medicine in Vienna, Austria. Within the last decade this team of researchers has discovered significant new evidence about the DNA make up of the horse and begun to unravel mysteries of equine origin that have been the subject of the debate for hundreds of years. In 2011, Dr. Wallner and a team of researchers, in a ground breaking study¹, discovered that, though limited in number, more than one haplotype or (characteristic) does exist in the Y chromosome of the horse. The researchers suggested a reason for the lack of diversity:

"The low NRY diversity in horses is assumed to be the result of the extremely low number of breeding males. Although polygamous mating behavior already occurred in the wild, followed by several genetic bottlenecks in the process and domestication process. Y-chromosomal variation might be severely further diminished in modern horse breeds by regulated breeding programs and intensive horse-trading."²

The research team's effort identified a way to distinguish haplotypes (or characteristics) of the Y chromosome in the horse. These six Y-chromosome haplotypes in modern horse breeds were identified in the extensive sample group tested. The haplotypes were labeled haplotypes 1-6 (HT1-HT6). Of these HT2, HT4, HT5, and HT6 appeared to have been derived from HT1, the oldest haplotype in the group, as a result of mutations to HT1 at some point in the past. The remaining stallion line HT3, appeared to be a secondary mutation of HT2 and HT3 has been shown to be indicative for the male progeny of the English Thoroughbred stallion Whalebone, 1807, great-grandson of the famous Eclipse, 1764.



NEW DISCOVERIES

Harrison Chief F.S.

In 2017 Dr. Wallner concluded an important follow-up study that included American Saddlebreds. In the new study the researchers discovered a way to differentiate the sire lines of the three Thoroughbred foundation sires from one another. This provided the first opportunity to examine the origins of our Saddlebred sire lines. In her previous study, separately identifying the Chief and Denmark lines would not have been possible as both lines are HT2. However, Dr. Wallner's new method allows the differentiation of subgroups within HT2 and the ability to identify if a sire line was descended from the Byerley Turk, the Darley Arabian or another line.

The new study brings insight into the origin of the modern horse and the dramatic impact of Middle Eastern and Western Asian horses imported into England in the 17th and 18th Centuries:

"Apart from few private northern European haplotypes, all modern horse breeds clustered together in a roughly 700-year-old haplogroup that was transmitted to Europe by the import of Oriental stallions. The Oriental horse group consisted of two major subclades (subgroup): the Original Arabian lineage and the Turkoman horse lineage."³

Interestingly, the research team concludes that the three foundation sires of the Thoroughbred, and thus many modern breeds including the American Saddlebred, were likely descended from Turkoman not Arabian sire lines, long a subject of sometimes fierce debate:

"We show that the English Thoroughbred MSY was derived from the Turkoman lineage and that English Thoroughbred sires are largely responsible for the predominance of this haplotype in modern horses."⁴

THE SADDLEBRED

The roots of the ancestry of the Saddlebred were put to the test in a new research project that analyzed the origin of the sire lines of the breed. One of the goals of the Wallner study was to provide Saddlebred enthusiasts with the first clear scientific evidence of the haplotypes and origin of Saddlebred sire lines. To achieve this objective, the haplotype of the Denmark line needed to match the sire line established by others recorded as descending from the Byerley Turk from other breeds studied. A similar match would be necessary between the Chief line and certain other male lines descending from the Darley Arabian.

Dr. Wallner required documented pedigree evidence of the Saddlebred sire lines being tested. She wanted to prove they traced back to the original Thoroughbred foundation sires. The Chief stallion lines tested in the study traced through Genius Bourbon King (primarily Supreme Sultan), Wing Commander, and Oman's Desdemona Denmark, while the Denmark lines traced through Stonewall King, Vanity's Sensation, Indiana Ace, and Kalarama Rex.

To provide DNA samples to researchers the help of owners of Saddlebred stallions and geldings was enlisted. Fred Sarver, Judy Werner, Joan Hamilton, Jackie Hale, April Vercoe, Rick Wedel, Karen Shelton Rader, Jerome Rader, Anna Marie Knipp, Danette Musselman, John Reiff, Robert Gardiner, and Dr. Ernest Bailey provided access to

hair samples, visited with others who could provide samples, or gave advice and counsel. This effort would not have been possible without them.

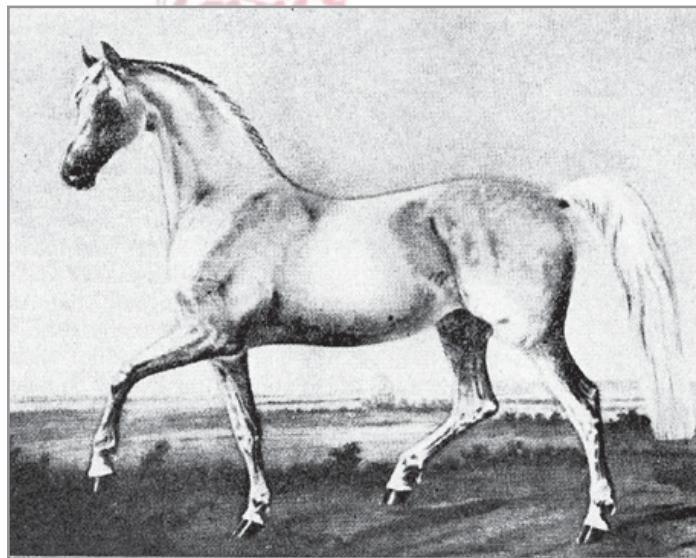
STUDY FINDINGS

The results of the analysis of the Saddlebred samples establish conclusive findings as to the origin of Saddlebred sire lines. The result? The recorded Saddlebred sire lines match the scientific evidence of their ancestry! Considering the number of owners and horses traveling back through time through three continents over 300 years the findings are truly amazing. According to the Wallner study:

"The seven stallions representing the Denmark line had HT Tb. This HT has also been carried by the Byerley Turk. The members of the Chief line had Tb-dM. This subtype derived from Tb-d has been already assigned to the line of Messenger - due to the fixation of Tb-dM in the Standardbred. The MSY haplotyping confirmed the ancestry of the two American Saddlebred stallion lines documented in the pedigree"⁵

The results of the analysis of the Saddlebred samples identified the characteristics of the Y chromosomes of the Denmark and Chief lines of the American Saddlebred. The study proves that these Saddlebred sire lines descend from two of the three Thoroughbred foundation sires⁶. The Chief line haplotype is the same as that found in the studies of the descendants of the Thoroughbred Messenger, the principal sire line of the American Standardbred and a descendent of the Darley Arabian. The Denmark lines tested were found to be consistent with the haplotype of other horses in other breeds purported to have descended from Byerley Turk line that were tested by Dr. Wallner's team.

Despite all of the possible mistakes, errors and misrepresentations that could have occurred during the past two hundred years, DNA results were consistent with the male lines shown in our Saddlebred pedigrees. The American Saddlebred now has a verification of the sire lineages that can be relied upon in the future. Many thanks are due to Dr. Wallner for including the Saddlebred in this research and to all of those who participated in it. "The Horse America Made" has more secrets hidden within its genes waiting to be discovered. We can learn much about the past of this beloved breed in continuing research and, hopefully, understand better how to preserve it for future generations.



Imported Messenger

1. The study led by Dr. Barbara Wallner of Vienna, Austria can be found online at: <http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0060015>
2. Wallner Study 2013
3. Wallner et al., 2017, Current Biology 27, 1-7 July 10, 2017 © 2017 Elsevier Ltd. <http://dx.doi.org/10.1016/j.cub.2017.05.086>
4. Wallner study 2017.
5. Special report of study results for the American Saddlebred from the Wallner Study.
6. This was true of all of the horses tested with only one exception. It is not clear if this was due to an incorrect sample or to an error in the pedigree of the horse at some point in the past.

NRY - Non-recombining Region of the Y chromosome
MSY - Male-specific region of the Y chromosome

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