



# ROH as hint of selection in the genome of a modern sport horse breed

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STIFTELSEN  
HÄSTFORSKNING



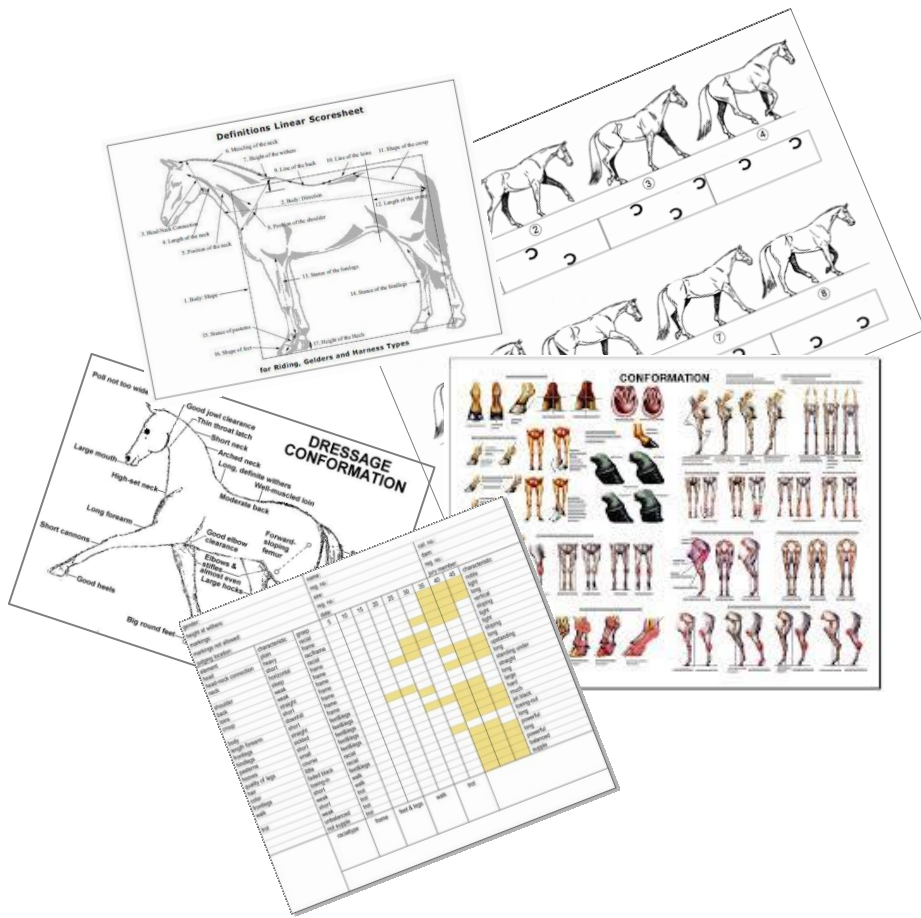
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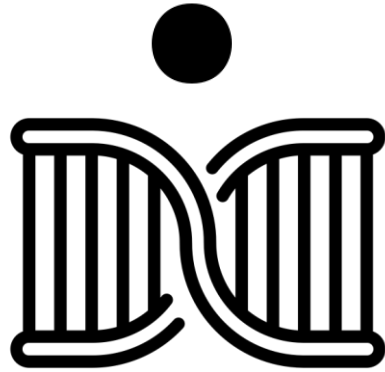
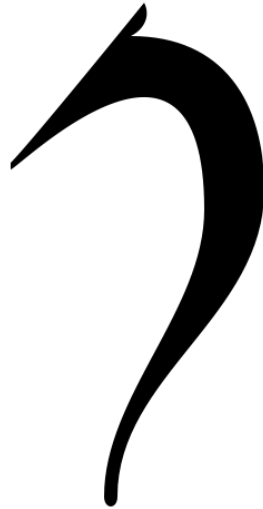
# **Selection for sport performance**



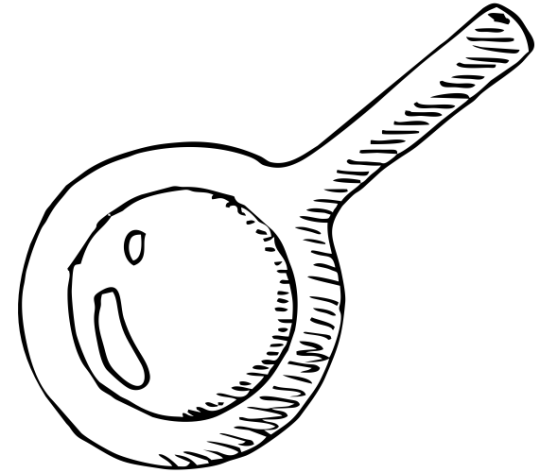




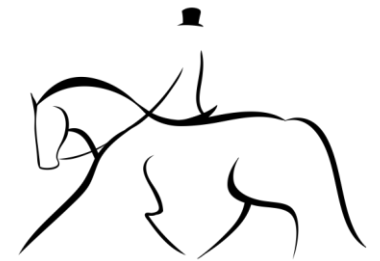
**Intensive use of phenotypic recording systems to estimate genetic parameters and breeding values for sport traits.**



# Aim of the study



**Detect genomic signatures of selection for sport performance in horses**



# Materials and Methods

**380 SWB horses**

genotyped with high-density SNP chip (670K)

**Runs of homozygosity**

were detected by using a sliding windows approach in PLINK v1.90



Photographer: Johannes Walter





# In addition...

**285 Exmoor ponies**  
were genotyped with  
670K SNP chip from a  
previous study (*Velie et  
al., 2016*)



# ROH:

- Runs of homozygosity are stretches of homozygous sites
- ROH can be useful to highlight signatures of strong selection



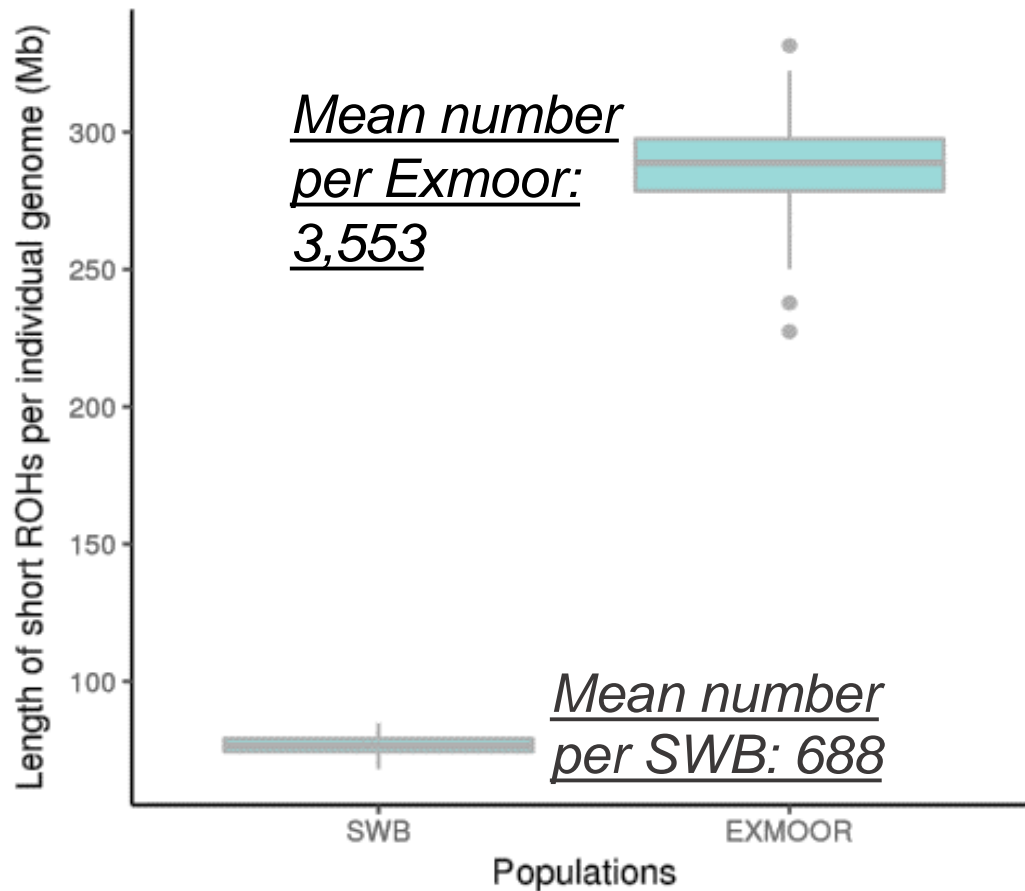
## ROH criteria:

- Length
- Number of SNP
- Density & Max gap

## Sliding window criteria:

- Size
- Heterozygous SNP
- Missing SNP

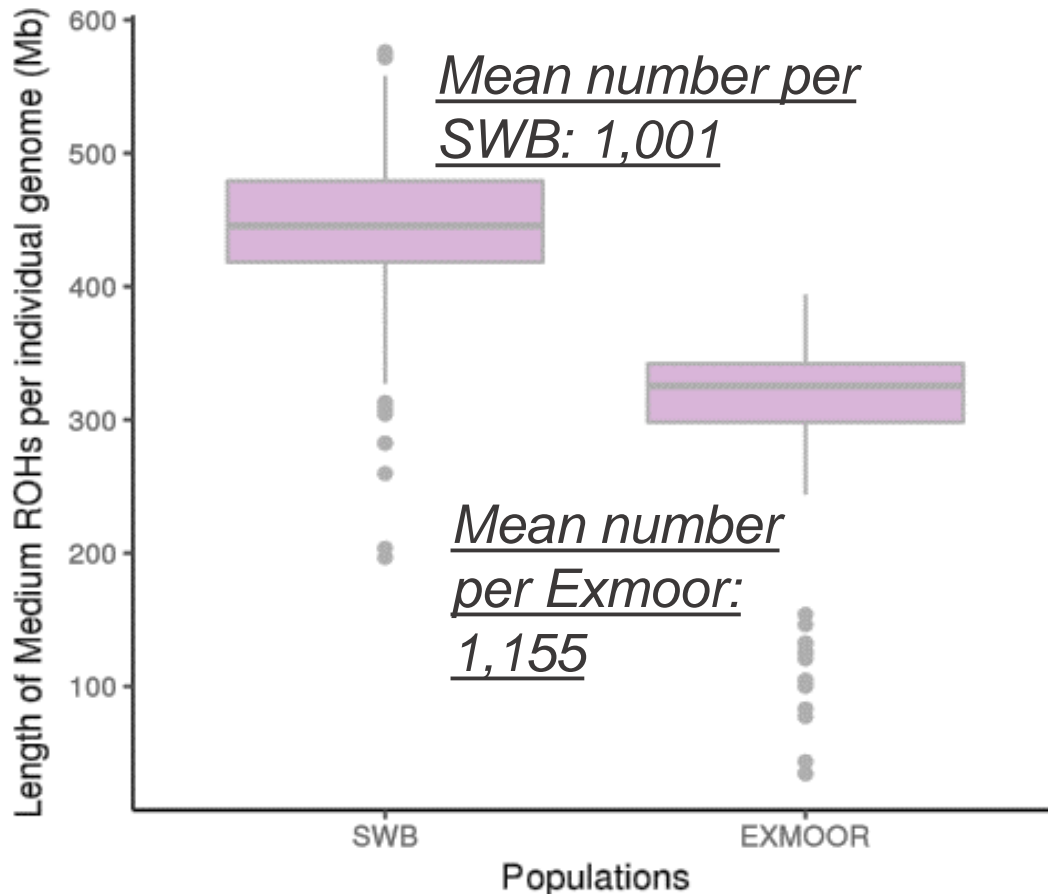
# Short



- » Short ROH were five times more abundant in Exmoor ponies
- » Short ROH were in both breeds spread across the genome

# Medium

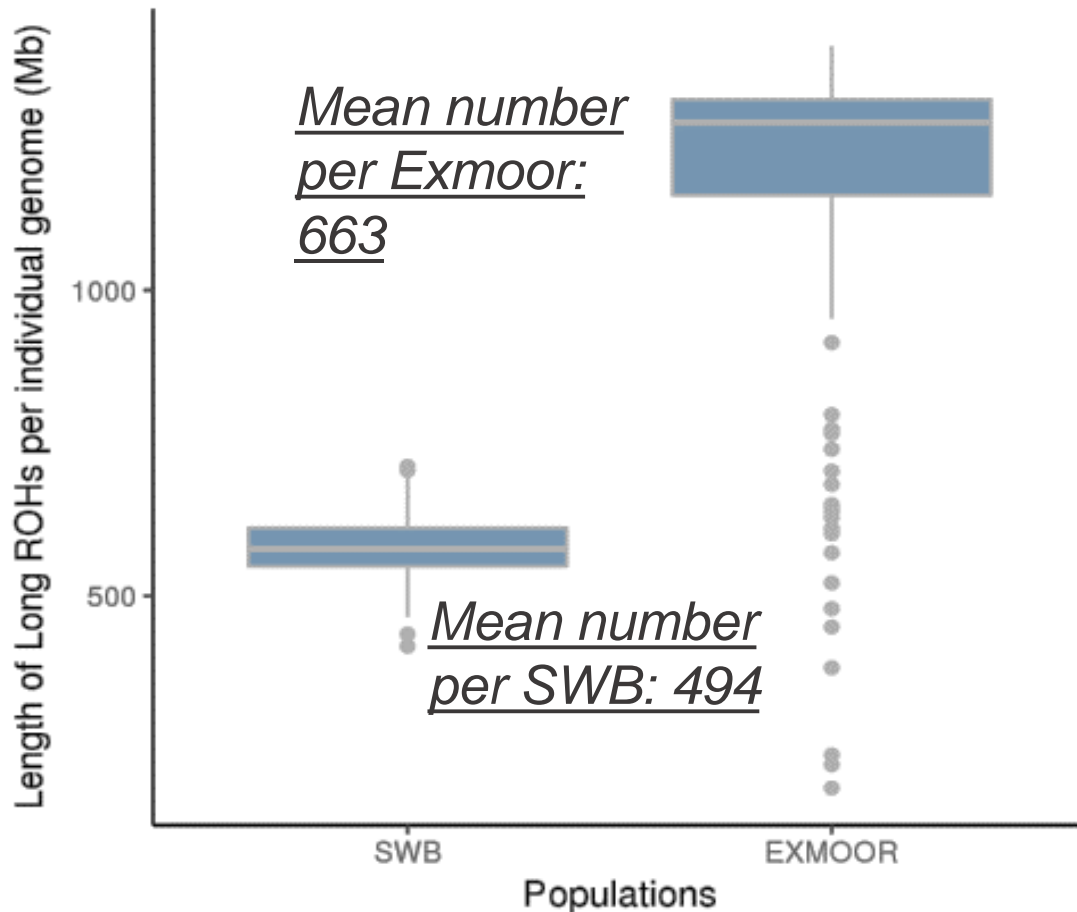
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- » Mean number per individual was similar in the two breeds
- » In SWB medium ROH covered on average more genome than in Exmoor

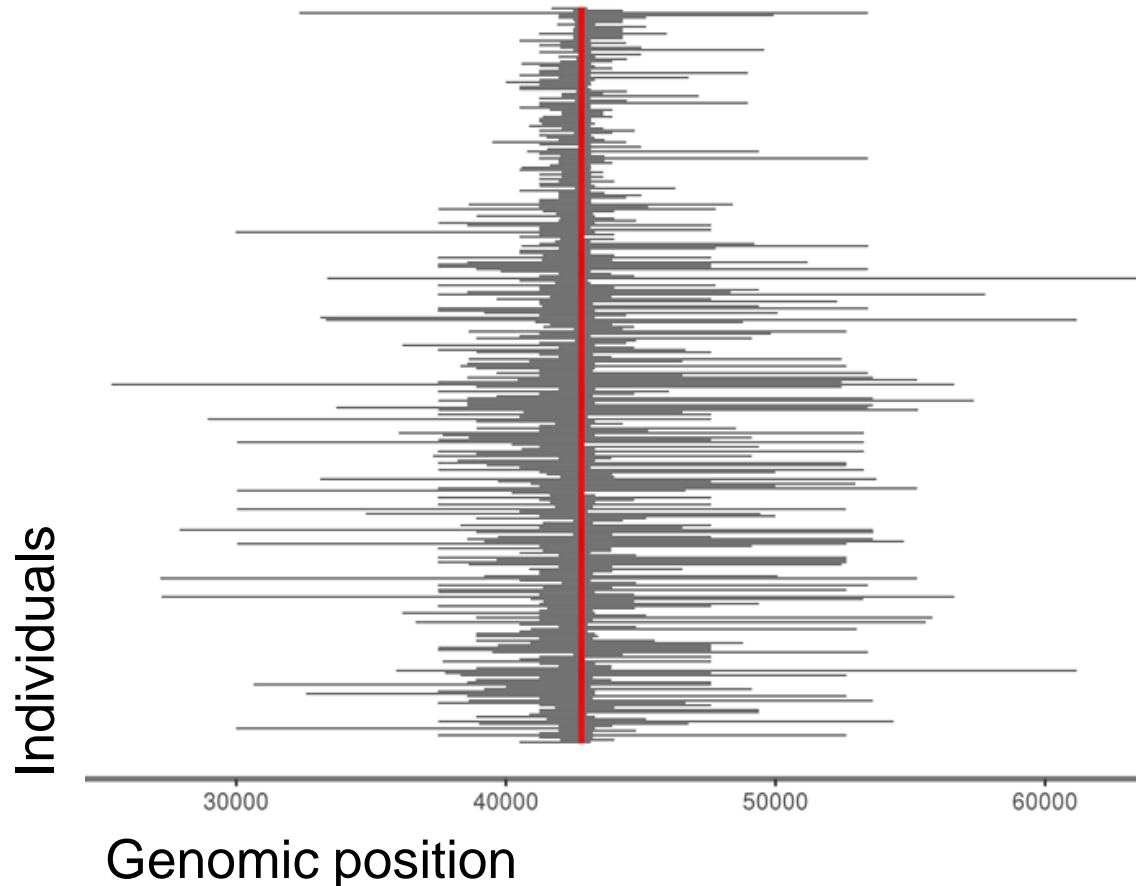
# Long

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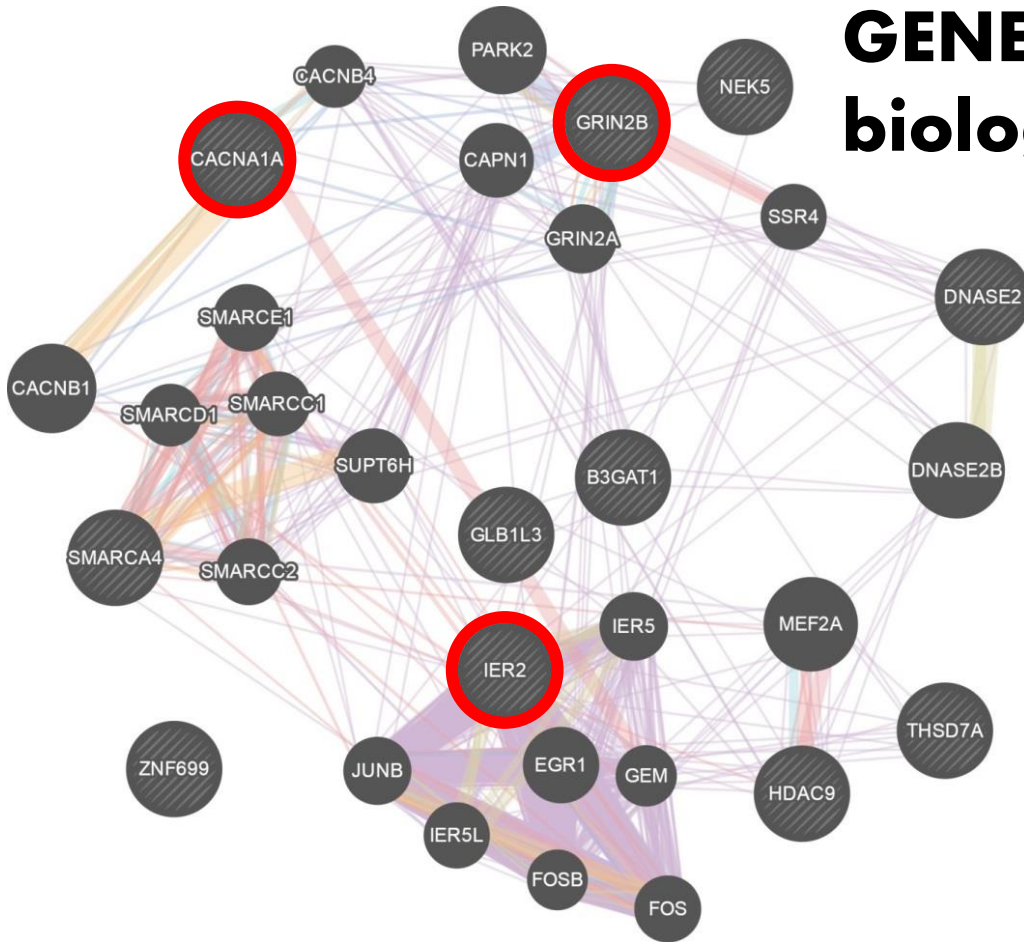


- » Long ROH were the rarest, although they covered the largest proportion of the genome in both breeds
- » Long ROH were spread along the genome in Exmoor ponies, rather than in few chromosomes only in SWB

**We filtered homozygous regions from the  
LONG ROH analysis shared among more than  
85% of SWB horses**



**GENES were biologically interrelated**



**Learning ability**  
**Memory**



**Muscle contraction  
&  
synapses response**



**Causative  
function in  
sport horses ?**





# **Signatures of selection in sport horses**

**Our findings help to  
unravel the complex  
nature of performance  
traits in horses.**

**Thank you for listening!**

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