

GEPHE SUMMARY

|                                                                                                                                                                                               |                |        |              |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------|--------------|
|                                                                                                                                                                                               | Gephebase Gene |        | GepheID      |
| Vertnin (VRTN) ( <a href="https://www.gephebase.org/search-criteria?/and+Gene">https://www.gephebase.org/search-criteria?/and+Gene</a><br>Gephebase=~Vertnin (VRTN)^#gephebase-summary-title) | GP00001165     |        |              |
|                                                                                                                                                                                               | Entry Status   | Martin | Main curator |
| Published                                                                                                                                                                                     |                |        |              |

PHENOTYPIC CHANGE

|                                                                                                                                                                                                                                                                                                                                      |                             |                                                                                                                                                                                                                                                                                                                                                  |                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
|                                                                                                                                                                                                                                                                                                                                      | Trait Category              |                                                                                                                                                                                                                                                                                                                                                  |                             |
| Morphology ( <a href="https://www.gephebase.org/search-criteria?/and+Trait">https://www.gephebase.org/search-criteria?/and+Trait</a><br>Category=~Morphology^#gephebase-summary-title)                                                                                                                                               |                             | Trait                                                                                                                                                                                                                                                                                                                                            |                             |
| Vertebrae number ( <a href="https://www.gephebase.org/search-criteria?/and+Trait=~Vertebrae">https://www.gephebase.org/search-criteria?/and+Trait=~Vertebrae</a><br>number^#gephebase-summary-title)                                                                                                                                 |                             |                                                                                                                                                                                                                                                                                                                                                  |                             |
|                                                                                                                                                                                                                                                                                                                                      | Trait State in Taxon A      |                                                                                                                                                                                                                                                                                                                                                  |                             |
| Sus scrofa                                                                                                                                                                                                                                                                                                                           |                             | Trait State in Taxon B                                                                                                                                                                                                                                                                                                                           |                             |
| Sus scrofa                                                                                                                                                                                                                                                                                                                           |                             |                                                                                                                                                                                                                                                                                                                                                  |                             |
|                                                                                                                                                                                                                                                                                                                                      | Ancestral State             |                                                                                                                                                                                                                                                                                                                                                  |                             |
| Data not curated                                                                                                                                                                                                                                                                                                                     |                             | Taxonomic Status                                                                                                                                                                                                                                                                                                                                 |                             |
| Domesticated ( <a href="https://www.gephebase.org/search-criteria?/and+Taxonomic">https://www.gephebase.org/search-criteria?/and+Taxonomic</a><br>Status=~Domesticated^#gephebase-summary-title)                                                                                                                                     |                             |                                                                                                                                                                                                                                                                                                                                                  |                             |
|                                                                                                                                                                                                                                                                                                                                      | Taxon A                     |                                                                                                                                                                                                                                                                                                                                                  | Taxon B                     |
|                                                                                                                                                                                                                                                                                                                                      | Latin Name                  |                                                                                                                                                                                                                                                                                                                                                  | Latin Name                  |
| Sus scrofa<br>( <a href="https://www.gephebase.org/search-criteria?/and+Taxon">https://www.gephebase.org/search-criteria?/and+Taxon</a> and Synonyms=~Sus<br>scrofa^#gephebase-summary-title)                                                                                                                                        |                             | Sus scrofa domesticus<br>( <a href="https://www.gephebase.org/search-criteria?/and+Taxon">https://www.gephebase.org/search-criteria?/and+Taxon</a> and Synonyms=~Sus scrofa<br>domesticus^#gephebase-summary-title)                                                                                                                              |                             |
|                                                                                                                                                                                                                                                                                                                                      | Common Name                 |                                                                                                                                                                                                                                                                                                                                                  | Common Name                 |
| pig                                                                                                                                                                                                                                                                                                                                  |                             | domestic pig                                                                                                                                                                                                                                                                                                                                     |                             |
|                                                                                                                                                                                                                                                                                                                                      | Synonyms                    |                                                                                                                                                                                                                                                                                                                                                  | Synonyms                    |
| pig; pigs; swine; wild boar; Sus scrofa Linnaeus, 1758; Sus scrofus                                                                                                                                                                                                                                                                  |                             | Sus domestica; Sus domesticus; Sus scrofa domestica; domestic pig                                                                                                                                                                                                                                                                                |                             |
|                                                                                                                                                                                                                                                                                                                                      | Rank                        |                                                                                                                                                                                                                                                                                                                                                  | Rank                        |
| species                                                                                                                                                                                                                                                                                                                              |                             | subspecies                                                                                                                                                                                                                                                                                                                                       |                             |
|                                                                                                                                                                                                                                                                                                                                      | Lineage                     |                                                                                                                                                                                                                                                                                                                                                  | Lineage                     |
| cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia;<br>Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii;<br>Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria;<br>Laurasiatheria; Cetartiodactyla; Suina; Suidae; Sus |                             | cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia;<br>Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii;<br>Dipnotetrapodomorpha; Tetrapoda; Amniota; Mammalia; Theria; Eutheria; Boreoeutheria;<br>Laurasiatheria; Cetartiodactyla; Suina; Suidae; Sus; Sus scrofa |                             |
|                                                                                                                                                                                                                                                                                                                                      | Parent                      |                                                                                                                                                                                                                                                                                                                                                  | Parent                      |
| Sus () - (Rank: genus)<br>( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9822">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9822</a> )                                                                                                                                                        |                             | Sus scrofa (pig) - (Rank: species)<br>( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9823">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9823</a> )                                                                                                                                                        |                             |
|                                                                                                                                                                                                                                                                                                                                      | NCBI Taxonomy ID            |                                                                                                                                                                                                                                                                                                                                                  | NCBI Taxonomy ID            |
| 9823<br>( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9823">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9823</a> )                                                                                                                                                                          |                             | 9825<br>( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9825">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=9825</a> )                                                                                                                                                                                      |                             |
|                                                                                                                                                                                                                                                                                                                                      | is Taxon A an Intraspecies? |                                                                                                                                                                                                                                                                                                                                                  | is Taxon B an Intraspecies? |
| No                                                                                                                                                                                                                                                                                                                                   |                             | No                                                                                                                                                                                                                                                                                                                                               |                             |

GENOTYPIC CHANGE

|                                                                                                                                                                                                                                             |                         |                                                                                                                        |                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------|-------------------------|
|                                                                                                                                                                                                                                             | Generic Gene Name       |                                                                                                                        | UniProtKB Mus musculus  |
| Vrtn                                                                                                                                                                                                                                        |                         | Q3SYK4 ( <a href="http://www.uniprot.org/uniprot/Q3SYK4">http://www.uniprot.org/uniprot/Q3SYK4</a> )                   |                         |
|                                                                                                                                                                                                                                             | Synonyms                |                                                                                                                        | GenebankID or UniProtKB |
| 7420416P09Rik                                                                                                                                                                                                                               |                         | BAJ11938 ( <a href="https://www.ncbi.nlm.nih.gov/nuccore/BAJ11938">https://www.ncbi.nlm.nih.gov/nuccore/BAJ11938</a> ) |                         |
|                                                                                                                                                                                                                                             | String                  |                                                                                                                        |                         |
| 10090.ENSMUSP00000093207<br>( <a href="http://string-db.org/newstring.cgi/show_network_section.pl?identifier=10090.ENSMUSP00000093207">http://string-db.org/newstring.cgi/show_network_section.pl?identifier=10090.ENSMUSP00000093207</a> ) |                         |                                                                                                                        |                         |
|                                                                                                                                                                                                                                             | Sequence Similarities   |                                                                                                                        |                         |
| Belongs to the vertnin family.                                                                                                                                                                                                              |                         |                                                                                                                        |                         |
|                                                                                                                                                                                                                                             | GO - Molecular Function |                                                                                                                        |                         |
| -                                                                                                                                                                                                                                           |                         |                                                                                                                        |                         |
|                                                                                                                                                                                                                                             | GO - Biological Process |                                                                                                                        |                         |
| -                                                                                                                                                                                                                                           |                         |                                                                                                                        |                         |
|                                                                                                                                                                                                                                             | GO - Cellular Component |                                                                                                                        |                         |
| -                                                                                                                                                                                                                                           |                         |                                                                                                                        |                         |
|                                                                                                                                                                                                                                             |                         |                                                                                                                        | Presumptive Null        |
| Unknown ( <a href="https://www.gephebase.org/search-criteria?/and+Presumptive">https://www.gephebase.org/search-criteria?/and+Presumptive</a> Null=~Unknown^#gephebase-summary-title)                                                       |                         |                                                                                                                        |                         |

Cis-regulatory (<https://www.gephebase.org/search-criteria?/and+Molecular+Type=^Cis-regulatory^#gephebase-summary-title>)

Unknown ([https://www.gephebase.org/search-criteria?/and+Aberration Type=^Unknown^#gephebase-summary-title](https://www.gephebase.org/search-criteria?/and+Aberration+Type=^Unknown^#gephebase-summary-title))

unknown ; observed transposon insertion in intron and promoter variation

Linkage Mapping (<https://www.gephebase.org/search-criteria?/and+Experimental+Evidence=^Linkage+Mapping^#gephebase-summary-title>)

Identification of a second gene associated with variation in vertebral number in domestic pigs. (2011) (<https://pubmed.ncbi.nlm.nih.gov/21232157/>)

Mikawa S; Sato S; Nii M; Morozumi T; Yoshioka G; Imaeda N; Yamaguchi T; Hayashi T; Awata T

The number of vertebrae in pigs varies and is associated with body size. Wild boars have 19 vertebrae, but European commercial breeds for pork production have 20 to 23 vertebrae. We previously identified two quantitative trait loci (QTLs) for number of vertebrae on *Sus scrofa* chromosomes (SSC) 1 and 7, and reported that an orphan nuclear receptor, NR6A1, was located at the QTL on SSC1. At the NR6A1 locus, wild boars and Asian local breed pigs had the wild-type allele and European commercial-breed pigs had an allele associated with increased numbers of vertebrae (number-increase allele).

Here, we performed a map-based study to define the other QTL, on SSC7, for which we detected genetic diversity in European commercial breeds. Haplotype analysis with microsatellite markers revealed a 41-kb conserved region within all the number-increase alleles in the present study. We also developed single nucleotide polymorphisms (SNPs) in the 450-kb region around the QTL and used them for a linkage disequilibrium analysis and an association study in 199 independent animals. Three haplotype blocks were detected, and SNPs in the 41-kb region represented the highest associations with the number of vertebrae. This region encodes an uncharacterized hypothetical protein that is not a member of any other known gene family. Orthologs appear to exist not only in mammals but also birds and fish. This gene, which we have named vertnin (VRTN) is a candidate for the gene associated with variation in vertebral number. In pigs, the number-increase allele was expressed more abundantly than the wild-type allele in embryos. Among candidate polymorphisms, there is an insertion of a SINE element (PRE1) into the intron of the Q allele as well as the SNPs in the promoter region.

Genetic diversity of VRTN is the suspected cause of the heterogeneity of the number of vertebrae in commercial-breed pigs, so the polymorphism information should be directly useful for assessing the genetic ability of individual animals. The number-increase allele of swine VRTN was suggested to add an additional thoracic segment to the animal. Functional analysis of VRTN may provide novel findings in the areas of developmental biology.

## Additional References

## RELATED GEPHE

(GCFN (NR6A1), Vertnin (VRTN) [possibly a pseudo-replicate of other Pig entry]) ([https://www.gephebase.org/search-criteria/?or+Taxon+ID=\\*9823\\*+and+Trait=Vertebrae+number/or+Taxon+ID=\\*9825\\*+and+Trait=Vertebrae+number/and+groupHaplotypes=true#gephebase-summary-title](https://www.gephebase.org/search-criteria/?or+Taxon+ID=*9823*+and+Trait=Vertebrae+number/or+Taxon+ID=*9825*+and+Trait=Vertebrae+number/and+groupHaplotypes=true#gephebase-summary-title))

No matches found.

## EXTERNAL LINKS

## COMMENTS

@TE