

GEPHE SUMMARY

<p>ndp (norrin) (<a href="https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=~ndp+(norrin)^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Gene+Gephebase=~ndp+(norrin)^#gephebase-summary-title</a>)</p> <p>Published</p>	<p>Gephebase Gene</p> <p>Entry Status</p>	<p>GP00002251</p> <p>Martin</p>	<p>GepheID</p> <p>Main curator</p>
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PHENOTYPIC CHANGE

<p>Morphology (<a href="https://www.gephebase.org/search-criteria?/and+Trait+Category=~Morphology^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait+Category=~Morphology^#gephebase-summary-title</a>)</p> <p>Coloration (plumage) (<a href="https://www.gephebase.org/search-criteria?/and+Trait=~Coloration+(plumage)^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Trait=~Coloration+(plumage)^#gephebase-summary-title</a>)</p> <p>Domestic pigeon with bar plumage</p> <p>Checker and T-checker melanistic patterns ; observed in feral populations ; co-dominant</p> <p>Taxon A</p> <p>Intraspecific (<a href="https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=~Intraspecific^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxonomic+Status=~Intraspecific^#gephebase-summary-title</a>)</p>	<p>Trait Category</p> <p>Trait</p> <p>Trait State in Taxon A</p> <p>Trait State in Taxon B</p> <p>Ancestral State</p> <p>Taxonomic Status</p>	
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	Taxon A	
	Latin Name	
Columba livia ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Columba+livia^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Columba+livia^#gephebase-summary-title</a> )		
	Common Name	
rock pigeon		
	Synonyms	
Columba livia domestica; rock pigeon; carrier pigeon; domestic pigeon; rock dove; Columba livia Gmelin, JF, 1789		
	Rank	
species		
	Lineage	
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Archelosauria; Archosauria; Dinosauria; Saurischia; Theropoda; Coelurosauria; Aves; Neognathae; Columbiformes; Columbidae; Columba		
	Parent	
Columba () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8931">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8931</a> )		
	NCBI Taxonomy ID	
8932 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8932">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8932</a> )		
	is Taxon A an Intraspecies?	
No		

	Taxon B #1	
	Latin Name	
Columba livia ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Columba+livia^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Columba+livia^#gephebase-summary-title</a> )		
	Common Name	
rock pigeon		
	Synonyms	
Columba livia domestica; rock pigeon; carrier pigeon; domestic pigeon; rock dove; Columba livia Gmelin, JF, 1789		
	Rank	
species		
	Lineage	
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Archelosauria; Archosauria; Dinosauria; Saurischia; Theropoda; Coelurosauria; Aves; Neognathae; Columbiformes; Columbidae; Columba		
	Parent	
Columba () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8931">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8931</a> )		
	NCBI Taxonomy ID	
8932 ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8932">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8932</a> )		
	is Taxon B an Intraspecies?	
No		

	Taxon B #2	
	Latin Name	
Columba guinea ( <a href="https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Columba+guinea^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Taxon+and+Synonyms=~Columba+guinea^#gephebase-summary-title</a> )		
	Common Name	
speckled pigeon		
	Synonyms	
speckled pigeon		
	Rank	
species		
	Lineage	
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Archelosauria; Archosauria; Dinosauria; Saurischia; Theropoda; Coelurosauria; Aves; Neognathae; Columbiformes; Columbidae; Columba		
	Parent	
Columba () - (Rank: genus) ( <a href="https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8931">https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=8931</a> )		

135627

(https://www.ncbi.nlm.nih.gov/Taxonomy/Browser/wwwtax.cgi?id=135627)

is Taxon B an Intraspecies?

No

## GENOTYPIC CHANGE

<p>Ndp</p> <p>ND; Ndph</p> <p>10090.ENSMUSP00000046692 (<a href="http://string-db.org/newstring.cgi/show_network_section.pl?identifier=10090.ENSMUSP00000046692">http://string-db.org/newstring.cgi/show_network_section.pl?identifier=10090.ENSMUSP00000046692</a>)</p> <p>-</p> <p>GO:0042803 : protein homodimerization activity (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0042803">https://www.ebi.ac.uk/QuickGO/term/GO:0042803</a>)</p> <p>GO:0005125 : cytokine activity (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005125">https://www.ebi.ac.uk/QuickGO/term/GO:0005125</a>)</p> <p>GO:0005109 : frizzled binding (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005109">https://www.ebi.ac.uk/QuickGO/term/GO:0005109</a>)</p> <p>GO:0045893 : positive regulation of transcription, DNA-templated (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0045893">https://www.ebi.ac.uk/QuickGO/term/GO:0045893</a>)</p> <p>GO:0051091 : positive regulation of DNA-binding transcription factor activity (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0051091">https://www.ebi.ac.uk/QuickGO/term/GO:0051091</a>)</p> <p>GO:0016055 : Wnt signaling pathway (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0016055">https://www.ebi.ac.uk/QuickGO/term/GO:0016055</a>)</p> <p>GO:0001890 : placenta development (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0001890">https://www.ebi.ac.uk/QuickGO/term/GO:0001890</a>)</p> <p>GO:0035426 : extracellular matrix-cell signaling (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0035426">https://www.ebi.ac.uk/QuickGO/term/GO:0035426</a>)</p> <p>GO:0110135 : Norrin signaling pathway (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0110135">https://www.ebi.ac.uk/QuickGO/term/GO:0110135</a>)</p> <p>GO:0061299 : retina vasculature morphogenesis in camera-type eye (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0061299">https://www.ebi.ac.uk/QuickGO/term/GO:0061299</a>)</p> <p>GO:0062023 : collagen-containing extracellular matrix (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0062023">https://www.ebi.ac.uk/QuickGO/term/GO:0062023</a>)</p> <p>GO:0031012 : extracellular matrix (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0031012">https://www.ebi.ac.uk/QuickGO/term/GO:0031012</a>)</p> <p>GO:0005615 : extracellular space (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0005615">https://www.ebi.ac.uk/QuickGO/term/GO:0005615</a>)</p> <p>GO:0009986 : cell surface (<a href="https://www.ebi.ac.uk/QuickGO/term/GO:0009986">https://www.ebi.ac.uk/QuickGO/term/GO:0009986</a>)</p> <p>Yes (<a href="https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Yes^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Presumptive Null=^Yes^#gephebase-summary-title</a>)</p> <p>Cis-regulatory (<a href="https://www.gephebase.org/search-criteria?/and+Molecular Type=^Cis-regulatory^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Molecular Type=^Cis-regulatory^#gephebase-summary-title</a>)</p> <p>Insertion (<a href="https://www.gephebase.org/search-criteria?/and+Aberration Type=^Insertion^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Aberration Type=^Insertion^#gephebase-summary-title</a>)</p> <p>10-100 kb</p> <p>CNV driven by tandem repeats with one (bar) two (checker) or four (T-checker) copies per chromosome between approximative positions 1790000 and 1805600</p> <p>Association Mapping (<a href="https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Association Mapping^#gephebase-summary-title">https://www.gephebase.org/search-criteria?/and+Experimental Evidence=^Association Mapping^#gephebase-summary-title</a>)</p> <p>Introgression of regulatory alleles and a missense coding mutation drive plumage pattern diversity in the rock pigeon. (2018) (<a href="https://pubmed.ncbi.nlm.nih.gov/30014848">https://pubmed.ncbi.nlm.nih.gov/30014848</a>)</p> <p>Vickrey AI; Bruders R; Kronenberg Z; Mackey E; Bohlender RJ; Maclary ET; Maynez R; Osborne EJ; Johnson KP; Huff CD; Yandell M; Shapiro MD</p> <p>Birds and other vertebrates display stunning variation in pigmentation patterning, yet the genes controlling this diversity remain largely unknown. Rock pigeons (<i>Columba livia</i>) are fundamentally one of four color pattern phenotypes, in decreasing order of melanism: T-check, checker, bar (ancestral), or barless. Using whole-genome scans, we identified NDP as a candidate gene for this variation. Allele-specific expression differences in NDP indicate cis-regulatory divergence between ancestral and melanistic alleles. Sequence comparisons suggest that derived alleles originated in the speckled pigeon (<i>Columba guinea</i>), providing a striking example of introgression. In contrast, barless rock pigeons have an increased incidence of vision defects and, like human families with hereditary blindness, carry start-codon mutations in NDP. In summary, we find that both coding and regulatory variation in the same gene drives wing pattern diversity, and post-domestication introgression supplied potentially advantageous melanistic alleles to feral populations of this ubiquitous urban bird.</p> <p>Â© 2018, Vickrey et al.</p>	<p>Generic Gene Name</p> <p>P48744 (<a href="http://www.uniprot.org/uniprot/P48744">http://www.uniprot.org/uniprot/P48744</a>)</p> <p>Synonyms</p> <p>Ø</p> <p>String</p> <p>Sequence Similarities</p> <p>-</p> <p>GO - Molecular Function</p> <p>GO - Biological Process</p> <p>GO - Cellular Component</p>	<p>UniProtKB Mus musculus</p> <p>GenebankID or UniProtKB</p> <p>Presumptive Null</p> <p>Molecular Type</p> <p>Aberration Type</p> <p>Insertion Size</p> <p>Molecular Details of the Mutation</p> <p>Experimental Evidence</p> <p>Main Reference</p> <p>Authors</p> <p>Abstract</p> <p>Additional References</p>
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## RELATED GEPHE

6 (MC1R, Mlana, slc2a11b, SLC45A2=MATP, SOX10, tyrosinase-related protein 1 (TYRP1)) (<https://www.gephebase.org/search-criteria?/or+Taxon>)

Related Genes

ID=<sup>8932</sup>/and+Trait=Coloration/or+Taxon ID=<sup>135627</sup>/and+Trait=Coloration/and+groupHaplotypes=true#gephebase-summary-title)

Related Haplotypes

1 ([https://www.gpbase.org/search-criteria?/or+Gene Gpbase=<sup>ndp \(norrin\)</sup>/and+Taxon ID=<sup>8932</sup>/or+Gene Gpbase=<sup>ndp \(norrin\)</sup>/and+Taxon ID=<sup>8932</sup>/or+Gene Gpbase=<sup>ndp \(norrin\)</sup>/and+Taxon ID=<sup>135627</sup>#gepbase-summary-title](https://www.gpbase.org/search-criteria?/or+Gene Gpbase=<sup>ndp (norrin)</sup>/and+Taxon ID=<sup>8932</sup>/or+Gene Gpbase=<sup>ndp (norrin)</sup>/and+Taxon ID=<sup>8932</sup>/or+Gene Gpbase=<sup>ndp (norrin)</sup>/and+Taxon ID=<sup>135627</sup>#gepbase-summary-title))

## EXTERNAL LINKS

## COMMENTS

@Parallelism @AllelicSeries @Introgression @CNV ; introgressed from C. guinea and is common in feral populations