

## OrthoDB bonus

Browsing OrthoDB - finding what you need!

\*Required

Use OrthoDB search and filtering options to find answers to the following questions.

# OrthoDB

1. (1) If you wanted to build a species phylogeny of the primates instead of a single gene tree (e.g. peroxidase example) you would need as many universal single-copy primate orthologues as possible - how many such orthologous groups are predicted by OrthoDB?

\*

Mark only one oval.

- 22583 groups      *Skip to question 2.*
- 7846 groups      *Skip to question 2.*
- 5813 groups      *Skip to question 3.*
- 4489 groups      *Skip to question 2.*

### Are you sure?

Check the following search options and try again

**[1] Make sure the 'Text search' box is clear (in order to return all groups)**

Text search:  ?

**[2] Make sure you have only the primates node (20 species) selected**

Search at: ?

Primates ▼

Species to display: Clear all

Eukaryota (*eucaryotes*)

Metazoa (*metazoans*)

Vertebrata (*vertebrates*)

Tetrapoda (*tetrapods*)

Mammalia (*mammals*)

Eutheria (*placentals*)

Euarchontoglires

Primates

all 20 selected ([reference s](#))

**[3] Make sure both your phyloprofile filters are correct to select orthologous groups with single-copy orthologues in all species**

Phyloprofile: ?

Present in all species ▼

Single-copy in all species ▼

2. (1) How many universal single-copy primate orthologous groups are predicted by OrthoDB? \*

Mark only one oval.

- 22583 groups *Skip to question 2.*
- 7846 groups *Skip to question 2.*
- 5813 groups *Skip to question 3.*
- 4489 groups *Skip to question 2.*

**Correct: 5813 universal single-copy OGs**

Your search at Primates level returned 5813 groups that span all species and single-copy in all species

Bookmark [OrthoDB@Primates](#) | [Get All Fasta](#) | [Get All as Tab delimited](#) ?

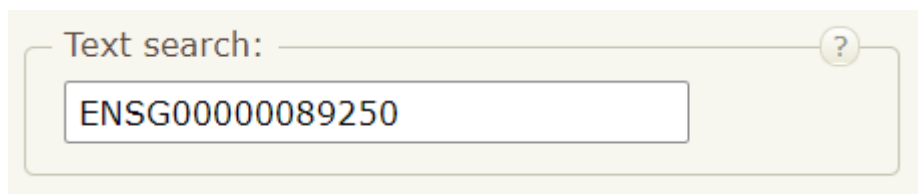
3. (2) What is the ENSEMBL gene identifier for the mouse (*Mus musculus*) orthologue of human nitric oxide synthase 1 (NOS1, ENSG00000089250) \*

Mark only one oval.

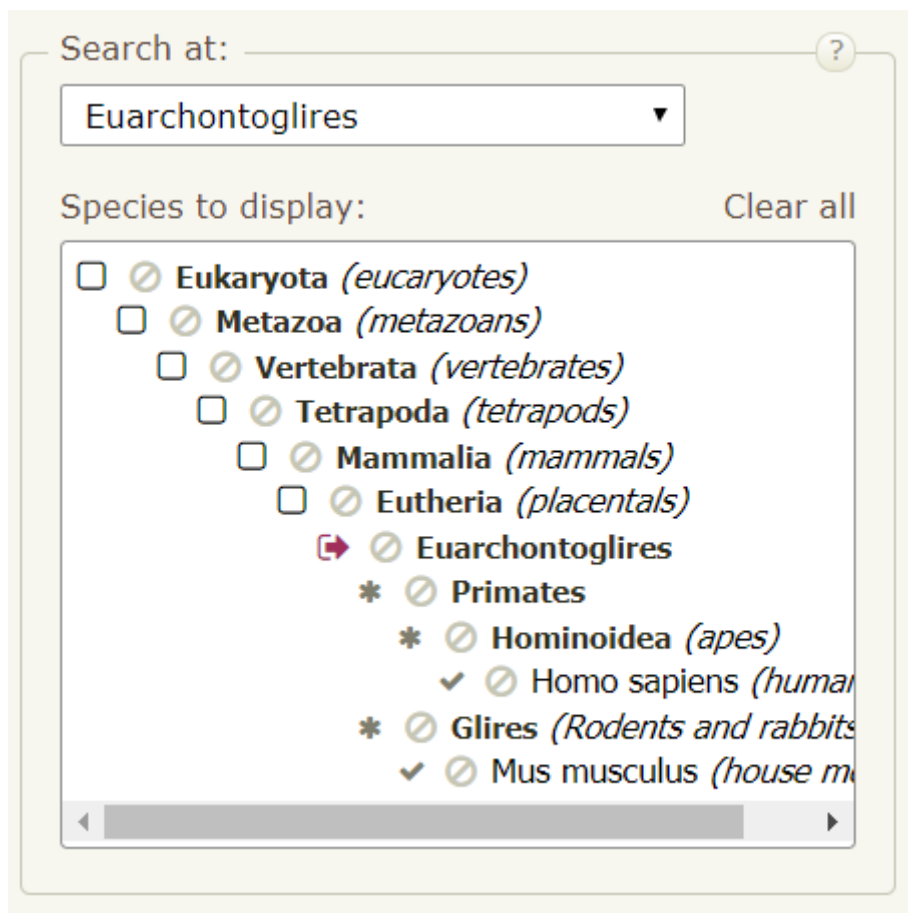
- ENSMUSG00000061578      Skip to question 4.
- ENSMUSG00000029361      Skip to question 5.
- ENSMUSG00000032898      Skip to question 4.
- ENSMUSG00000029359      Skip to question 4.

**Are you sure?**

**[1] Searching with gene IDs is usually better than with gene names as IDs are generally more likely to be unique, so use: ENSG00000089250**



**[2] Make sure you selected human and mouse**





**[3] You will need to expand (click on chevrons) the mouse gene annotation to access cross-references to other databases and find the ENSEMBL gene ID**

Orthologs by organism		Selected species only	
Organism	Protein ID   UniProt   Description	AAs	Exons InterPro
<b>Homo sapiens</b>	NOS1 (P29475) bNOS >>>	1468	30 Q IPR001478 12:
<b>Mus musculus</b>	Nos1 (F8WGF2) Similarity: Contains 1 PDZ (DHR) domain. >>>>	1463	29 Q IPR001478 12:

#### [4] Note the ENSEMBL logo to help you locate the ENSEMBL gene ID for the mouse orthologue

irreversible damage, STRETCHING OF SMOOTH MUSCLE CIRCULARLY ENRICHED WITH ELASTIN WITH INCREASE IN THE BULK SIZE OF fluids; THICK VENTRICULAR WALL: increased depth of the cardiac wall of the heart ventricles; VISCERAL VASC vessel network of the internal organs enclosed within the cavity of the body, such as the thoracic, abdominal, &

 **Ensembl:** [ENSMUSG00000029361](#) nitric oxide synthase 1, neuronal [Source:MGI Symbol;Acc:MGI:97360]

 **UniProt:** [F8WGF2](#) Similarity: Contains 1 PDZ (DHR) domain.  
CTD: [4842](#)

4. (2) What is the ENSEMBL gene identifier for the mouse (*Mus musculus*) orthologue of human nitric oxide synthase 1 (NOS1, ENSG00000089250) \*

Mark only one oval.

- ENSMUSG00000061578 *Skip to question 4.*
- ENSMUSG00000029361 *Skip to question 5.*
- ENSMUSG00000032898 *Skip to question 4.*
- ENSMUSG00000029359 *Skip to question 4.*

**Correct: ENSMUSG00000029361**

5. (3) Amongst the 23 ray-finned fishes (actinopterygii), which species appears to have 2 full-length orthologues of this NOS1 gene? \*

Mark only one oval.

- Danio rerio (Zebrafish) *Skip to question 6.*
- Scleropages formosus (Asian bonytongue) *Skip to question 6.*
- Cynoglossus semilaevis (Tongue sole) *Skip to "Correct: Cynoglossus semilaevis (Tongue sole)."*
- Tetraodon nigroviridis (Spotted green pufferfish) *Skip to question 6.*

**Are you sure?**

**[1] By selecting the 'Actinopterygii' node on the species selector tree you can add all 23 species to your search selection (note that by doing so the Last Common Ancestor node will switch to 'Vertebrata')**

- ▼  Actinopterygii 23 (*ray-finned fishes*) e.g. zebrafish, platyfish
  - ▶  Cichliformes 5
  - ▶  Cyprinodontiformes 3 e.g. platyfish
    - Astyanax mexicanus* (*Mexican tetra*)
    - Clupea harengus* (*Atlantic herring*)
    - Cynoglossus semilaevis* (*tongue sole*)
    - Danio rerio* (*zebrafish*)
    - Esox lucius* (*northern pike*)
    - Gadus morhua* (*Atlantic cod*)
    - Gasterosteus aculeatus* (*three-spined stickleback*)
    - Larimichthys crocea* (*large yellow croaker*)
    - Lepisosteus oculatus* (*spotted gar*)
    - Notothenia coriiceps* <sup>M</sup> (*black rockcod*)
    - Oryzias latipes* (*Japanese medaka*)
    - Scleropages formosus* <sup>M</sup> (*Asian bonytongue*)
    - Stegastes partitus* (*bicolor damselfish*)
    - Takifugu rubripes* (*torafugu*)
    - Tetraodon nigroviridis* (*spotted green pufferfish*)

**[2] By scrolling down through the fish orthologues you will see only 2 species that have 2 orthologues predicted. By checking the lengths of the proteins however, you will see that the *S. formosus* proteins are much shorter (see exclamation marks !! indicating more than 2 standard deviations shorter than the median orthologue length, so they are likely truncated annotations). The *C. semilaevis* proteins however both appear to be full length orthologues.**

<b><u>Clupea harengus</u></b>		
	105901066 nitric oxide synthase 1 (neuronal) >	1438
<b><u>Cynoglossus semilaevis</u></b>		
1	103396877 nitric oxide synthase, brain-like >	1424
2	103397851 nitric oxide synthase 1 (neuronal) >	1426
<b><u>Danio rerio</u></b>		
	nos1 (F1QVR0 ) Nitric oxide synthase >>>	1431
<b><u>Esox lucius</u></b>		
	105031277 nitric oxide synthase 1 (neuronal) >	1441
<b><u>Gadus morhua</u></b>		
	ENSGMOG00000014839 nitric oxide synthase 1 (neuronal) >>	!!546
<b><u>Gasterosteus aculeatus</u></b>		
	ENSGACG00000014163 nitric oxide synthase 1 (neuronal) >	!!587
<b><u>Larimichthys crocea</u></b>		
	KKF18333.1	1371
<b><u>Lepisosteus oculatus</u></b>		
	ENSLOCG00000003433 (W5M6U0 ) Similarity:Contains 1 PDZ (DHR) domain. >>>	1441
<b><u>Notothenia coriiceps</u></b> ⓘ		
	104967506 nitric oxide synthase 1 (neuronal) >	1435
<b><u>Oryzias latipes</u></b>		
	nos1 (H2L651 ) Nitric oxide synthase >>>	1423
<b><u>Scleropages formosus</u></b> ⓘ		
1	KKX05439.1	!!494
2	KKX09556.1	!!245
<b><u>Stegastes partitus</u></b>		
	103365040 nitric oxide synthase 1 (neuronal) >	1199
<b><u>Takifugu rubripes</u></b>		
	LOC101066909 (H2UXZ7 ) Nitric oxide synthase >>>	1430
<b><u>Tetraodon nigroviridis</u></b>		
	ENSTNIG00000015610 (H3C394 ) Nitric oxide synthase >>>	1423

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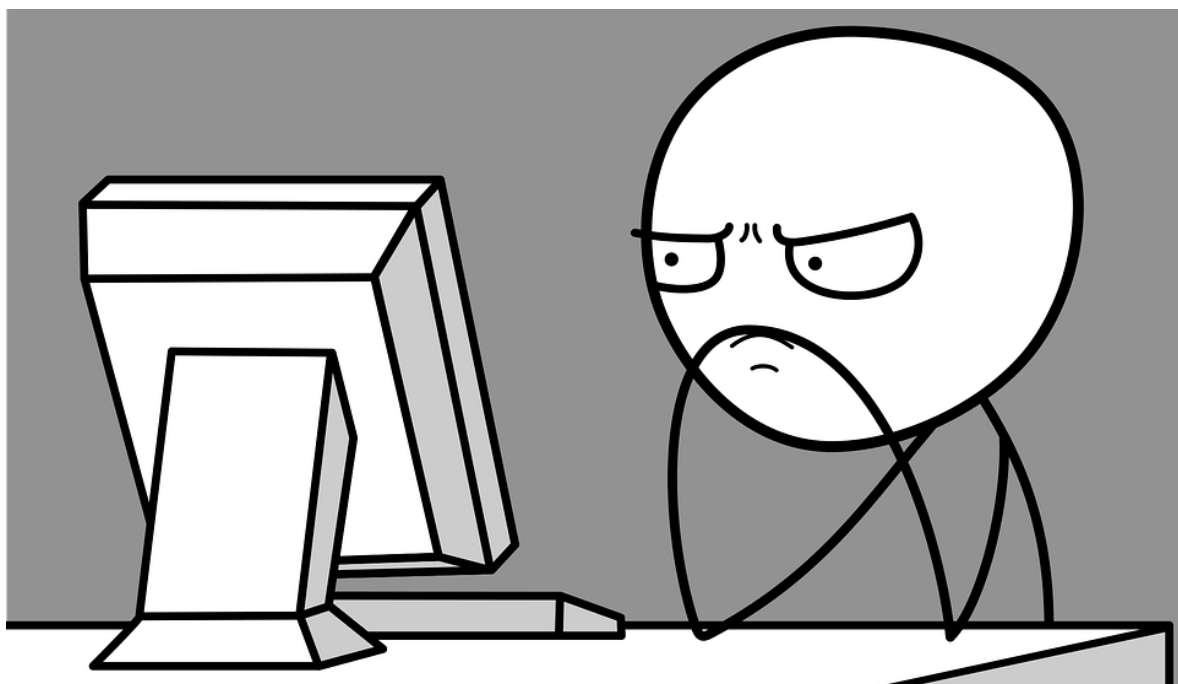
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- Tetraodon nigroviridis (Spotted green pufferfish) *Skip to question 6.*

**Correct: Cynoglossus semilaevis (Tongue sole)**

**C. semilaevis has 2 orthologues (1424 and 1426 amino acids), the only other fish with 2 orthologues is S. formosus but these appear to be truncated annotations (494 and 245 amino acids).**

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**That's it for now ... click NEXT to finish. Any questions? We're here to help!**



*Skip to "Submit to conclude this exercise."*

**Submit to conclude this exercise**

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