

Functional annotation in Apollo

There are two options to add function annotation in VEuPathDB:

- 1) Adding a user comment on the gene record page
- 2) Using the community annotation tool Apollo

Functional annotation can involve:

- Adding or changing the description of a gene or product
- Assigning or changing a gene name/symbol
- Adding Gene Ontology (GO) terms
- Adding a publication
- Adding an EC number

In this manual we are showing you step by step how to add a gene name, product description and GO term to a gene in Apollo.

1) Accessing Apollo

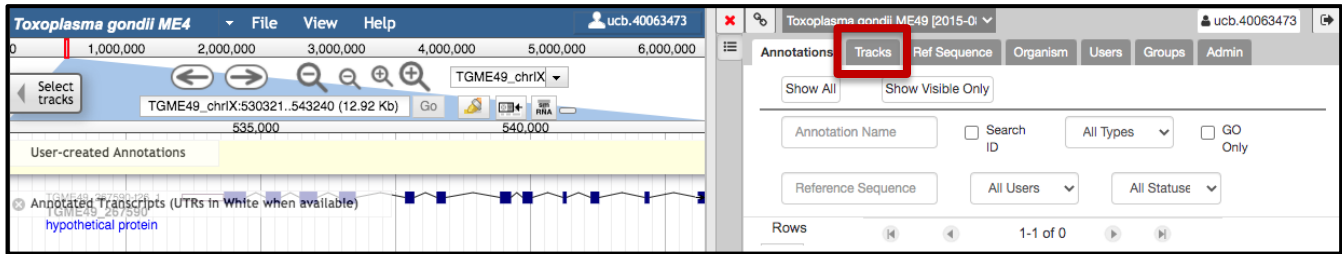
To access Apollo go to the gene record page of your gene of interest and click on the link **View and update community annotations in Apollo** (1). You can also access Apollo from the gene models section by clicking on the button **Annotate in Apollo** (2). Alternatively, go to the **Tools** menu and choose Apollo from the drop-down list (3).

The screenshot shows the ToxoDB website interface. At the top, there is a search bar and a navigation menu. The 'Tools' menu is highlighted with a red circle and a black box containing the number 3. Below the navigation menu, the gene record page for TGME49_267590 is displayed. The page includes a section for 'Add the first user comment' and 'View and update community annotations in Apollo', which is highlighted with a red circle and a black box containing the number 1. Below this, there is a section for 'Gene models' with a table of exons and transcripts. The 'Annotate in Apollo' button is highlighted with a red circle and a black box containing the number 2. The page also features a 'Shortcuts' section with links to Synteny, Alignments, Phenotype, SNPs, Transcriptomics, Protein Features, and Proteomics.

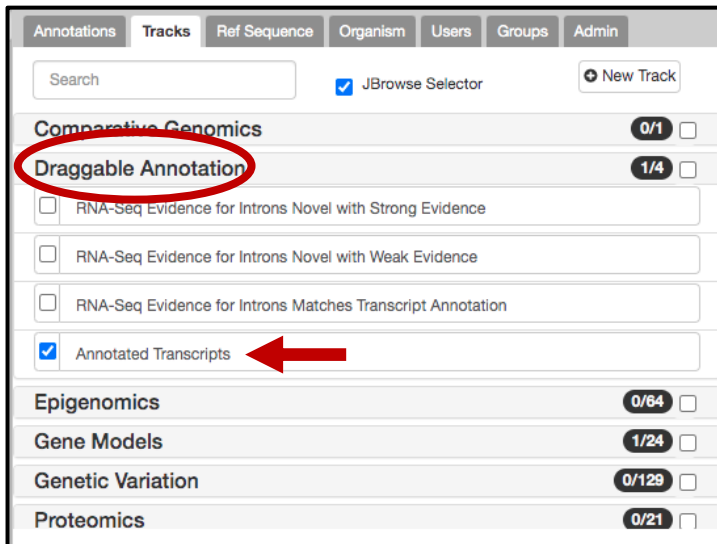
To use Apollo you need to be logged into VEuPathDB. If you have not done so yet log now into Apollo with your VEuPathDB user ID and password.

2) Dragging and dropping the annotation

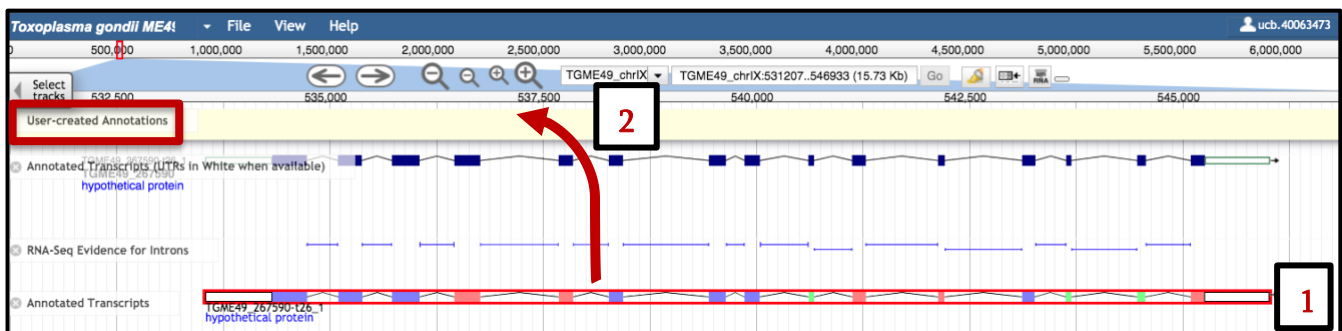
Select on the menu on the right-hand side the tab **Tracks**.



Click on the menu item **Draggable Annotation** and select **Annotated Transcripts**.

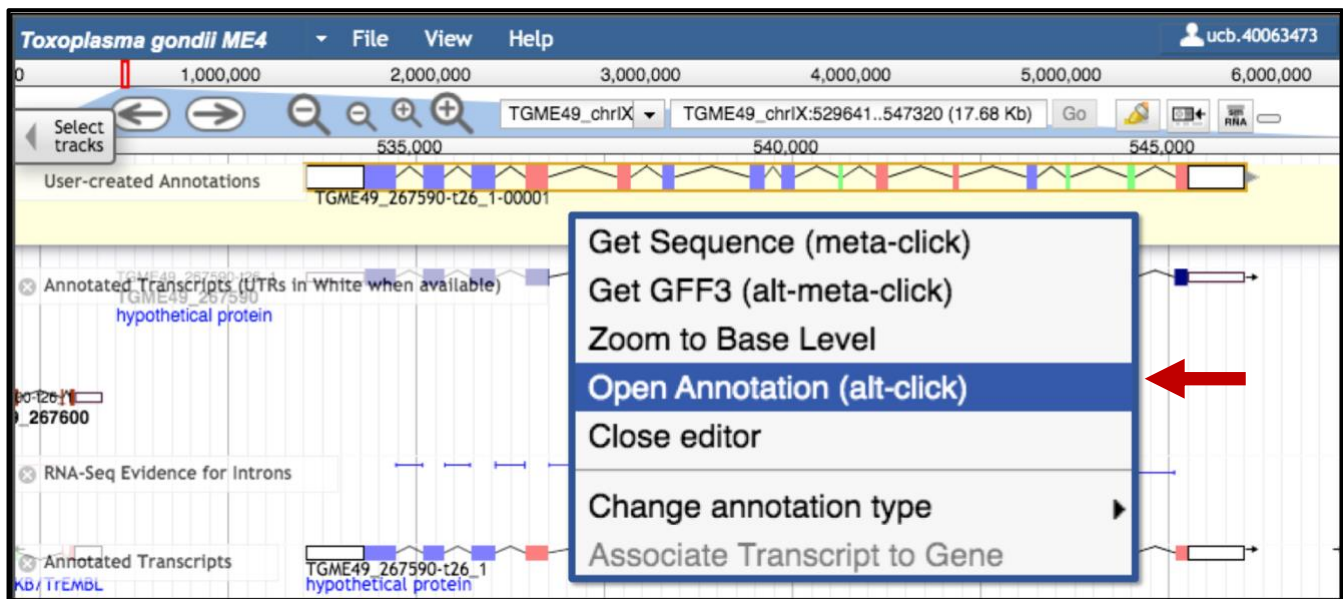


You can now see your gene of interest in the Annotated Transcript track. Select the gene model by clicking on one of the introns or by double clicking on the gene model (1). The gene model will show up with red boundaries. Drag and drop the gene into the User-created Annotations area (2).

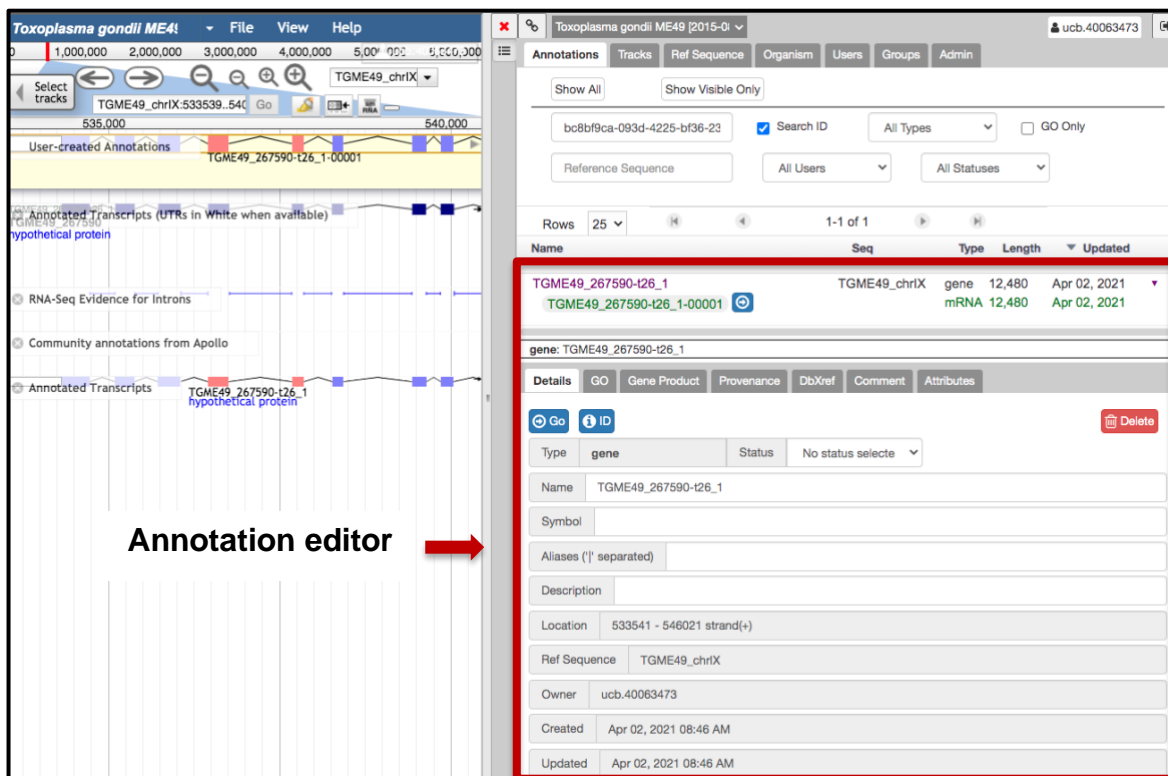


3) Opening of the Annotation editor window

Select the gene in the User-created Annotation track and with a right-click open the drop-down menu and choose **Open Annotation**. Alternatively, you can use the short-cut **alt-click**.



The annotation editor window is now shown on the right-hand side.



4) Adding Functional annotation

In this example we are showing you how to improve the functional annotation of TGME49_267590. This gene is currently annotated as hypothetical protein. It has been experimentally characterised in the following publication:

<https://pubmed.ncbi.nlm.nih.gov/27594426>

Gene name/symbol: CLAMP

Gene product: Claudin-like apicomplexan microneme protein

GO term: microneme

PMID: 27594426

Adding a gene name/symbol

Once the annotations panel (1) is open click on the details tab (2) and add the gene name in the field Symbol (3). In our example the new gene name/symbol is CLAMP.

The screenshot shows the database interface for *Toxoplasma gondii* ME49 [2015-01]. The 'Annotations' tab is selected (1). Below it, the 'Details' tab is selected (2). The 'Symbol' field is highlighted with a red oval and labeled (3), containing the text 'CLAMP'. The 'Name' field contains 'TGME49_267590-t26_1'. The 'Type' is 'gene'. The 'Status' is 'No status selecte'. The 'Location' is '533541 - 546021 strand(+)'. The 'Ref Sequence' is 'TGME49_chrlX'. The 'Owner' is 'ucb.40063473'. The 'Created' date is 'Mar 12, 2021 08:15 AM'. The 'Updated' date is 'Mar 12, 2021 08:42 AM'.

Name	Seq	Type	Length	Updated
TGME49_267590-t26_1	TGME49_chrlX	gene	12,480	Mar 12, 2021
TGME49_267590-t26_1-00001		mRNA	12,480	Mar 12, 2021

gene: TGME49_267590-t26_1

Field	Value
Type	gene
Status	No status selecte
Name	TGME49_267590-t26_1
Symbol	CLAMP
Aliases (' ' separated)	
Description	
Location	533541 - 546021 strand(+)
Ref Sequence	TGME49_chrlX
Owner	ucb.40063473
Created	Mar 12, 2021 08:15 AM
Updated	Mar 12, 2021 08:42 AM

Adding a product description

To add a product description choose the tab **Gene Product** (1) and click on **New** at the bottom of the editor window (2).

Name	Seq	Type	Length	Updated
TGME49_267590-t26_1	TGME49_chrlX	gene	12,480	Apr 02, 2021
TGME49_267590-t26_1-00001		mRNA	12,480	Apr 02, 2021

gene: TGME49_267590-t26_1

Details GO **Gene Product** 1 Evidence DbXref Comment Attributes

Name Evidence Based On Reference

New 2 Delete

Fill in the fields product, evidence and PMID. Click on Save. More information about evidence codes can be found here: <http://geneontology.org/docs/guide-go-evidence-codes>

Add new Gene Product to TGME49_267590-t26_1-00001

Product claudin-like apicomplexan mic ☐ Alternate **Evidence** ECO:0000314 ☐ All ECO Evidence [Info](#)

With Prefix : ID + Add

Reference PMID : 27594426

Note + Add

Save Cancel

Adding GO terms

Choose the tab GO in the editor window, fill in the required fields and click on Save.

Add new GO Annotation to TGME49_267590-t26_1-00001

Aspect: CC (cellular component)

Go Term: GO:0020009 (microneme (GO:0020009))

Relationship between Gene Product and GO Term: part of

Evidence: ECO:0000314 (IDA (ECO:0000314): direct assay evidence used in manual assertion)

With: Prefix : ID : + Add

Reference: PMID : 27594426

Note: + Add

Save Cancel

Adding a PubMed ID

Choose the Tab DbXref in the annotation editor window, add the PMID as shown in the screenshot. Click on the + sign.

gene: TGME49_267590-t26_1

Details GO Gene Product Provenance **DbXref** Comment Attributes

Prefix Accession

PMID Accession +

27594426 +

A small window will come up showing the title of the Pubmed Article. Click OK.

Add article A Genome-wide CRISPR Screen in Toxoplasma Identifies Essential Apicomplexan Genes.

Cancel OK

You can also add additional database identifiers (DbXref), i.e. EC numbers.

Details		Coding		GO		Gene Product		Provenance		DbXref		Comment		Attributes	
Prefix		Accession		EC		2.7.1.1									
				PMID											

5) Finalising the functional annotation

Go to the **Attributes** tab in the gene section, choose from the “Select canned tag” drop-down menu **annotation**.

gene: TGME49_267590-t26_1

Details		GO		Gene Product		Provenance		DbXref		Comment		Attributes	
Prefix		Accession		Tag		Value							
				Select canned tag		structural		user_comment		annotation			

From the “Select canned value” drop-down menu choose **added_product**. Repeat this and choose **added_symbol**, **added_go** and **added_pmid**. Finally click on the + sign.

Details		GO		Gene Product		Provenance		DbXref		Comment		Attributes	
Prefix		Accession		annotat		Value							
				annotation		Select canned value		added_comment		split		merge	
						retain_previous		added_product		added_go		added_symbol	
						added_alias		added_pmid		removed_product		added_ec_number	
						delete		isoform		new		modify	
						added_dbxref							

gene: TGME49_267590-t26_1

Details	GO	Gene Product	Provenance	DbXref	Comment	Attributes
<div> <div>▲ Prefix</div> <div>Accession</div> </div>						<div>Tag</div> <div>Value</div> <div>+</div>
<div> <div>annotation</div> <div>added_symbol</div> </div>						<div>Select can</div> <div>▼</div>
<div> <div>annotation</div> <div>added_pmidi</div> </div>						<div>Select can</div> <div>▼</div>
<div> <div>annotation</div> <div>added_go</div> </div>						
<div> <div>annotation</div> <div>added_product</div> </div>						

In the last step, go back to the Details tab and add to the gene and mRNA the status **Finished**.

TGME49_267590-t26_1

TGME49_chrlX gene 12,480 Mar 12, 2021

TGME49_267590-t26_1-00001 mRNA 12,480 Mar 12, 2021

gene: TGME49_267590-t26_1

Details	GO	Gene Product	Provenance	DbXref	Comment	Attributes
<div> <div>Go</div> <div>ID</div> </div>						
Type	gene	Status	<div> <div>✓ No status selected</div> <div>Finished</div> <div>Not Finished</div> <div>Requires Curator</div> </div>			
Name	TGME49_267590-t26_1					
Symbol	CLAMP					

Delete

Done! For additional questions, please get in touch with the VEuPathDB help desk.