

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
- 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 terms to a gene in Apollo.

1) Accessing Apollo

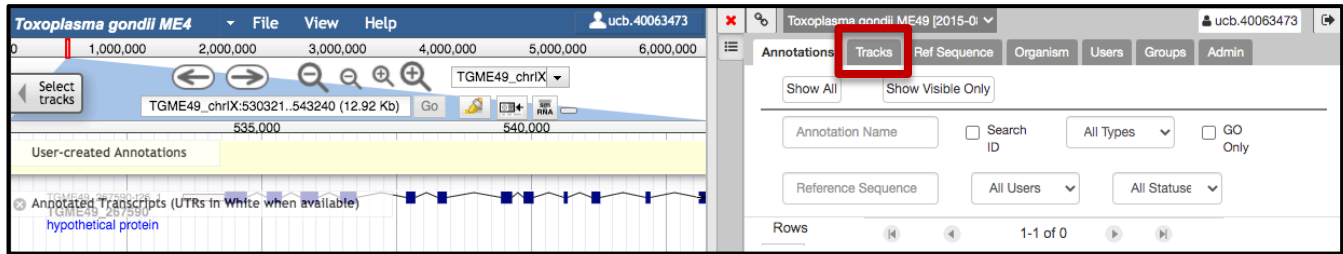
To access Apollo go to the gene record page of your gene of interest and click on the link **View and update community annotations in Apollo**. You can also access Apollo from the gene models section by clicking on the button **Annotate in Apollo**.

The screenshot shows the ToxoDB website interface. At the top, there is a search bar and navigation links. The main content area displays the gene record for TGME49_267590, a hypothetical protein. Key information includes: Type: protein coding gene, Chromosome: IX, Location: TGME49_chrIX:533,542..546,021(+), Species: Toxoplasma gondii, Strain: ME49, and Status: Reference Strain. A red circle highlights the link "View and update community annotations in Apollo" under the "Add the first user comment" section. Below this, the "Gene models" section is visible, showing 15 exons and 1 transcript. A red circle highlights the "Annotate in Apollo" button at the bottom right of the page.

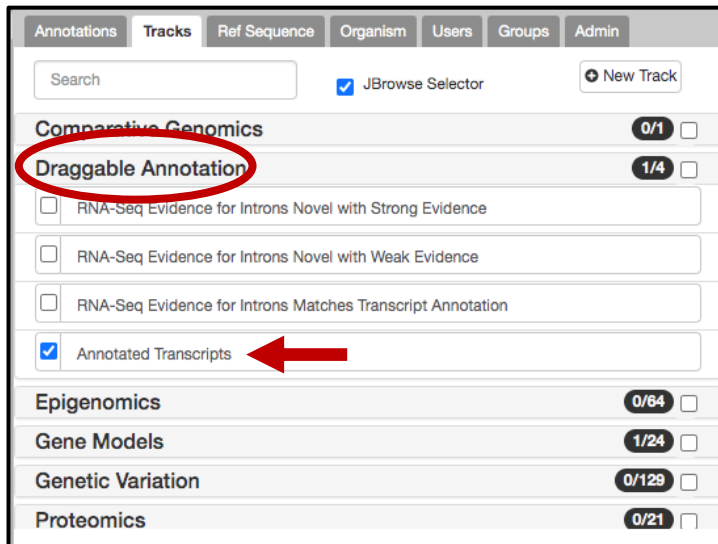
To use Apollo you need to be logged into VEuPathDB. If you have not done so yet log now into Apollo with your VEuPathDB user ID and password.

2) Dragging and dropping the annotation

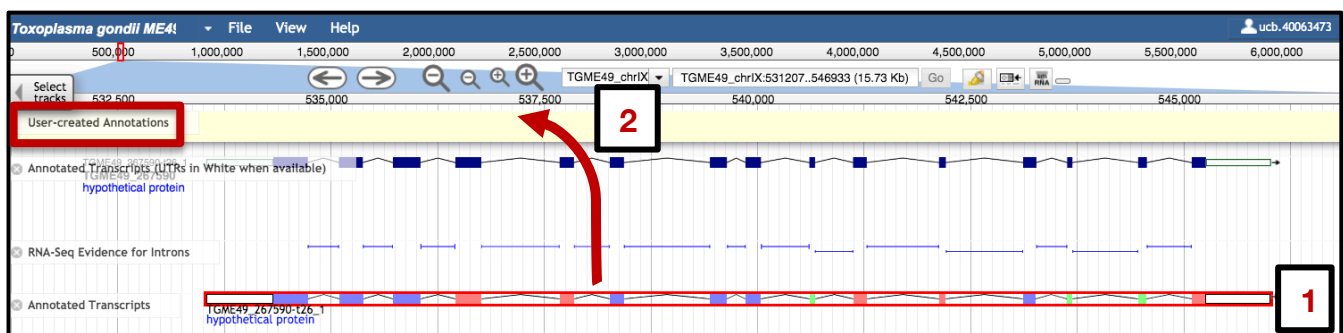
Select on the menu on the right-hand side the tab **Tracks**.



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

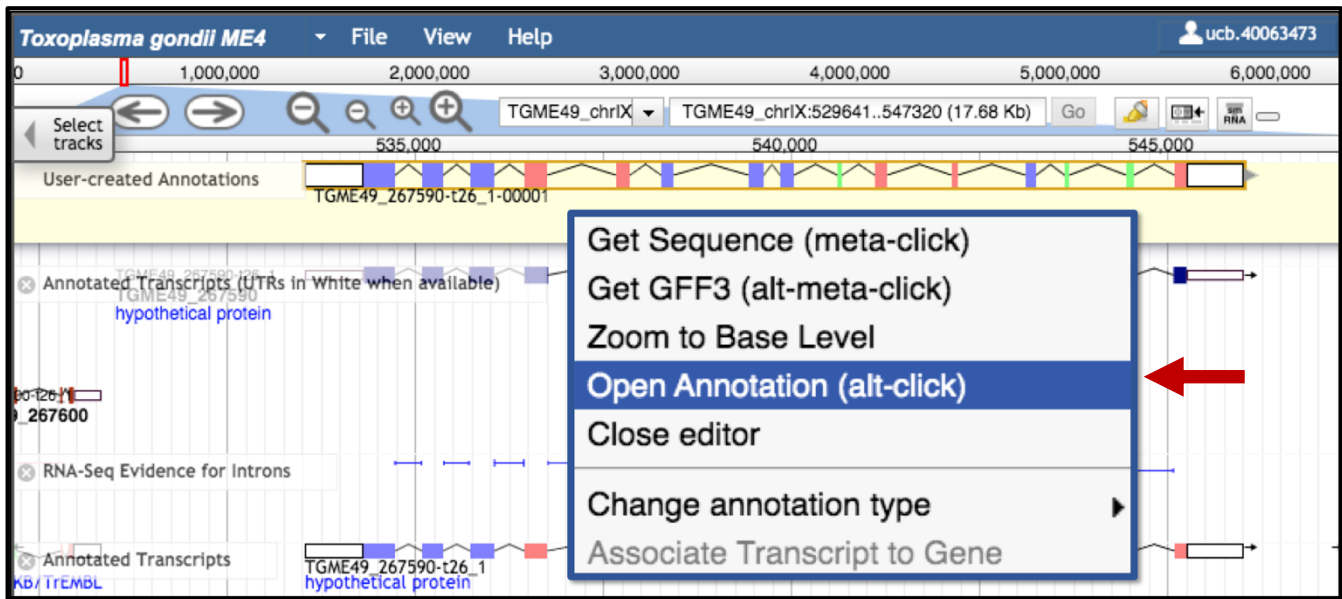


You can now see your gene of interest in the Annotated Transcript track. Select the gene model by clicking on one of the introns or by double clicking on the gene model (1). The gene model will show up with red boundaries. Drag and drop the gene into the User-created Annotations area (2).

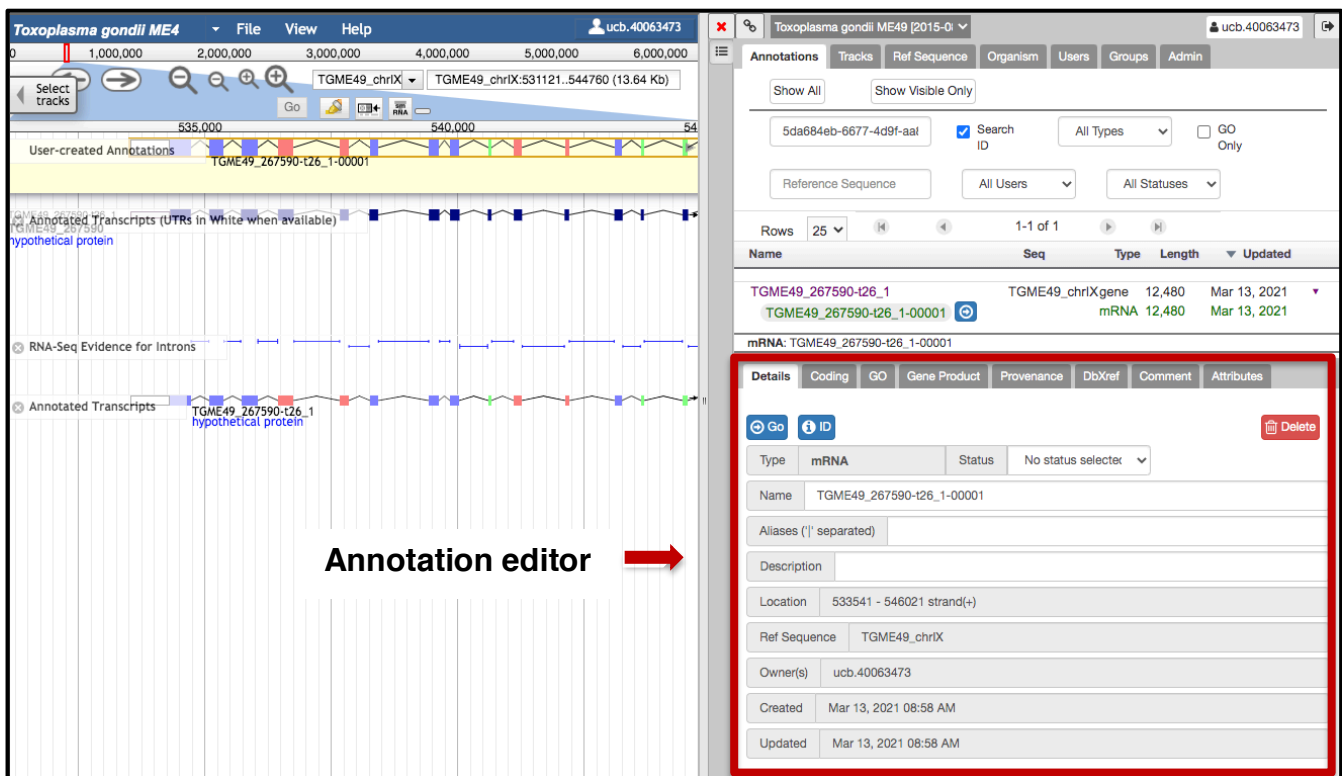


3) Opening the Annotation editor window

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 (or 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 and highlighted with a red box and a '1' in a black box. Below it, the 'Details' tab is selected and highlighted with a red box and a '2' in a black box. In the 'Details' section, the 'Symbol' field is highlighted with a red oval and a '3' in a black box, containing the text 'CLAMP'. The 'Name' field contains 'TGME49_267590-t26_1'. The 'Type' is set to 'gene'. The 'Status' is 'No status selecte'. The 'Location' is '533541 - 546021 strand(+)'. The 'Ref Sequence' is 'TGME49_chriX'. 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'. A 'Delete' button is visible in the top right of the details section.

Name	Seq	Type	Length	Updated
TGME49_267590-t26_1	TGME49_chriX	gene	12,480	Mar 12, 2021
TGME49_267590-t26_1-00001		mRNA	12,480	Mar 12, 2021

gene: TGME49_267590-t26_1

Details

Go ID Delete

Type: gene Status: No status selecte

Name: TGME49_267590-t26_1

Symbol: CLAMP

Aliases (' ' separated)

Description

Location: 533541 - 546021 strand(+)

Ref Sequence: TGME49_chriX

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 select the mRNA (1), choose the tab Gene Product (2) and click on **New** at the bottom of the editor window (3).

The screenshot shows the Gene Product editor interface. At the top, a table lists sequences. The second row, 'TGME49_267590-t26_1-00001', is highlighted in green and labeled with a red box and the number '1'. Below the table, a series of tabs are visible: 'Details', 'Coding', 'Gene Product' (labeled with a red box and the number '2'), 'Provenance', 'DbXref', 'Comment', and 'Attributes'. The 'Gene Product' tab is active, showing a large empty text area. At the bottom left, a 'New' button is highlighted with a red box and labeled with a red box and the number '3'.

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>

The screenshot shows the 'Add new Gene Product to TGME49_267590-t26_1-00001' dialog box. It contains several input fields and buttons. The 'Product' field is filled with 'claudin-like apicomplexan mic'. The 'Evidence' field is filled with 'ECO:0000314'. There is an 'Alternate' checkbox and an 'All ECO Evidence' checkbox. Below these, there is a 'With' section with 'Prefix' and 'ID' fields, and an '+ Add' button. The 'Reference' section has a 'PMID' field filled with '27594426' and an '+ Add' button. At the bottom, there is a 'Note' field and an '+ Add' button. A red circle highlights the 'Save' button at the bottom left.

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 (circled in red), 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.

mRNA: TGME49_267590-t26_1-00001

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

Prefix, Accession

PMID, Accession, +

27594426, + (circled in red)

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 (circled in red)

You can also add additional database identifiers (dx_xrefs), 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**. 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.

gene: TGME49_267590-t26_1

Details		GO	Gene Product	Provenance	DbXref	Comment	Attributes	
▲ Prefix		Accession		Tag		Value		+
				✓ Select canned tag		Select can ▼		
				structural				
				user_comment				
				annotation				←

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**

▲ Prefix Accession

annotation	added_symbol
annotation	added_pmId
annotation	added_go
annotation	added_product

Tag Value +

Select can ▼ Select can ▼

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

+ Go i ID Delete

Type gene Status

Name TGME49_267590-t26_1

Symbol CLAMP

☒ No status selected
☐ **Finished**
☐ Not Finished
☐ Requires Curator

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