

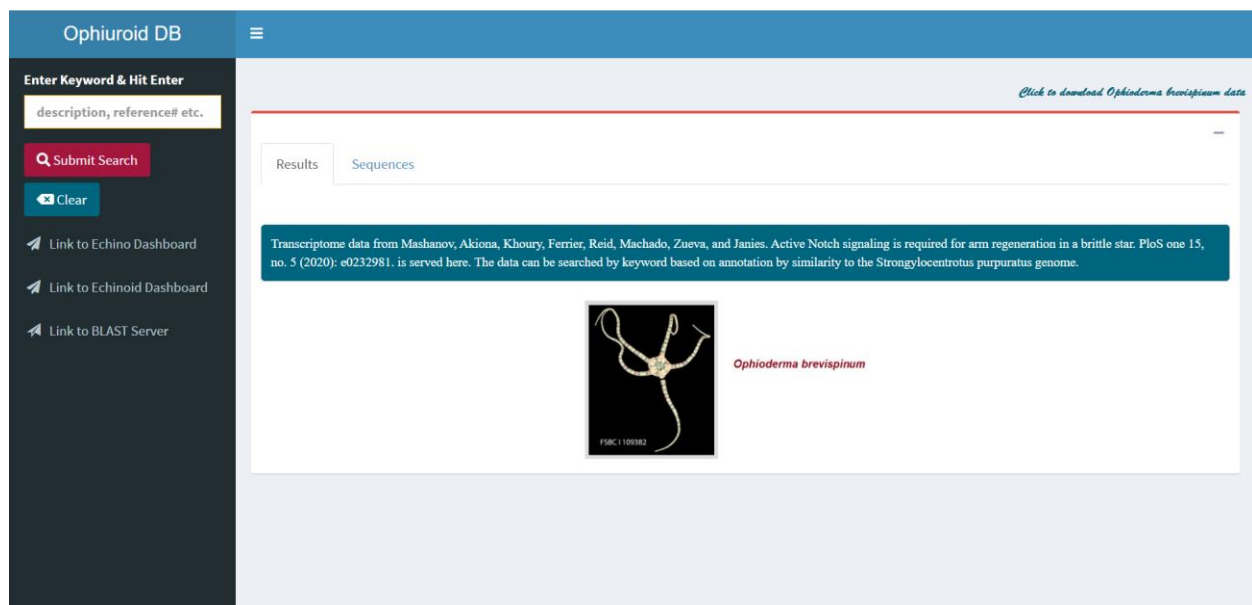
# Ophiuroid Database (OphiuroidDB) User Manual

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## 1. Access Ophiuroid DB Application

Click on the following link to access the application: <https://echinodb.uncc.edu/BStarApp>



The screenshot displays the Ophiuroid DB application interface. The top navigation bar is blue with the text "Ophiuroid DB" and a hamburger menu icon. On the left, a dark sidebar contains a search input field with the placeholder "Enter Keyword & Hit Enter" and the text "description, reference# etc.". Below the search field are buttons for "Submit Search" (with a magnifying glass icon) and "Clear" (with an 'x' icon). Further down are three links: "Link to Echino Dashboard", "Link to Echinoid Dashboard", and "Link to BLAST Server". The main content area has a light blue header with a link "Click to download Ophioderma brevispinum data". Below this are two tabs: "Results" (selected) and "Sequences". A teal banner contains the text: "Transcriptome data from Mashanov, Akiona, Khoury, Ferrier, Reid, Machado, Zueva, and Janies. Active Notch signaling is required for arm regeneration in a brittle star. PloS one 15, no. 5 (2020): e0232981. is served here. The data can be searched by keyword based on annotation by similarity to the Strongylocentrotus purpuratus genome." Below the banner is a small image of a brittle star, labeled "PSBC | 100302" in the bottom left corner. To the right of the image is the text "Ophioderma brevispinum".

## 2. Perform Search against Transcriptome Data for *Ophioderma brevispinum* in Ophiuroid Database (Mashanov et al. 2020)

The user can search the transcriptome data of the brittle star *Ophioderma brevispinum* (Mashanov et al. 2020) in the Ophiuroid Database. Use any keyword or string such as “zinc”, “chlor”, “iron” or NCBI’s Reference Number such as XP\_0221120 for conducting search. Hit “Submit Search” button or “Enter” key in the upper left side of the web page.

The screenshot shows the Ophiuroid Database search interface. The search bar contains the keyword 'XP\_0221120'. The search results page displays 23 results found. The results are shown in a table with columns: Best BLAST Hit Used in Annotation, Best BLAST Hit Used in Description, sseq-send, and Ophioderma brevispinum ClusterID. The first six results are listed below:

	Best BLAST Hit Used in Annotation	Best BLAST Hit Used in Description	sseq-send	Ophioderma brevispinum ClusterID
1	XP_022112078.1	helicase with zinc finger domain 2-like [Acanthaster planci]	271-3117	Cluster-267986.18
2	XP_022112078.1	helicase with zinc finger domain 2-like [Acanthaster planci]	386-3116	Cluster-355517.0
3	XP_022112056.1	presequence protease, mitochondrial-like isoform X2 [Acanthaster planci]	33-1013	Cluster-320771.3
4	XP_022112025.1	alanine-tRNA ligase, cytoplasmic-like isoform X2 [Acanthaster planci]	32-999	Cluster-342685.1
5	XP_022112053.1	jerky protein homolog-like isoform X2 [Acanthaster planci]	13-465	Cluster-178199.0
6	XP_022112029.1	coiled-coil domain-containing protein 65-like isoform X2	225-547	Cluster-123424.0

➤ With XP\_0221120 keyword, 23 results are found.

- **Other Search Options**

You can search by description or NCBI’s Reference Number in the search box in top right corner.

The screenshot shows the Ophiuroid Database search interface with the search bar containing the keyword 'mitoch'. The search results page displays 23 results found, but only two are visible on the current page. The search bar is highlighted with a red box. The results are shown in a table with columns: Best BLAST Hit Used in Annotation, Best BLAST Hit Used in Description, sseq-send, and Ophioderma brevispinum ClusterID. The visible results are:

	Best BLAST Hit Used in Annotation	Best BLAST Hit Used in Description	sseq-send	Ophioderma brevispinum ClusterID
3	XP_022112056.1	presequence protease, mitochondrial-like isoform X2 [Acanthaster planci]	33-1013	Cluster-320771.3
7	XP_022112067.1	mitochondrial carrier homolog 2-like [Acanthaster planci]	1-315	Cluster-322386.1

Showing 1 to 2 of 2 entries (filtered from 23 total entries)

Transcriptome data from Mashanov, Akiona, Khoury, Ferrier, Reid, Machado, Zueva, and Janies. Active Notch signaling is required for arm regeneration in a brittle star. *PLoS one* 15, no. 5 (2020): e0232981. is served here. The data can be searched by keyword based on annotation by similarity to the *Strongylocentrotus purpuratus* genome.

- **Downloading Search Results**

A link “Click to download *Ophioderma brevispinum* data” is provided in the top right corner to download transcriptome sequences for *Ophioderma brevispinum* species.

Enter Keyword & Hit Enter  
XP\_0221120  
Submit Search  
Clear

Link to Echino Dashboard  
Link to Echinoid Dashboard  
Link to BLAST Server

Allows to download RNA-Seq sequences for *Ophioderma brevispinum* in a text file [Click to download \*Ophioderma brevispinum\* data](#)

Results Sequences

23 result(s) found

Show 10 entries Search: mitoch

	Best BLAST Hit Used in Annotation	Best BLAST Hit Used in Description	sseq-send	Ophioderma brevispinum ClusterID
3	XP_022112056.1	presequence protease, mitochondrial-like isoform X2 [Acanthaster planci]	33-1013	Cluster-320771.3
7	XP_022112067.1	mitochondrial carrier homolog 2-like [Acanthaster planci]	1-315	Cluster-322386.1

Showing 1 to 2 of 2 entries (filtered from 23 total entries)

Previous 1 Next

Transcriptome data from Mashanov, Akiona, Khoury, Ferrier, Reid, Machado, Zueva, and Janies. Active Notch signaling is required for arm regeneration in a brittle star. PLoS one 15, no. 5 (2020): e0242981. is served here. The data can be searched by keyword based on annotation by similarity to the *Strongylocentrotus purpuratus* genome.

### 3. Visualizing Sequences

Select a whole row and the record will be highlighted with blue (you can only perform one selection at a time).

Enter Keyword & Hit Enter  
XP\_0221120  
Submit Search  
Clear

Link to Echino Dashboard  
Link to Echinoid Dashboard  
Link to BLAST Server

[Click to download \*Ophioderma brevispinum\* data](#)

Results Sequences

23 result(s) found

Show 10 entries Search:

	Best BLAST Hit Used in Annotation	Best BLAST Hit Used in Description	sseq-send	Ophioderma brevispinum ClusterID
1	XP_022112078.1	helicase with zinc finger domain 2-like [Acanthaster planci]	271-3117	Cluster-267986.18
2	XP_022112078.1	helicase with zinc finger domain 2-like [Acanthaster planci]	386-3116	Cluster-355517.0
3	XP_022112056.1	presequence protease, mitochondrial-like isoform X2 [Acanthaster planci]	33-1013	Cluster-320771.3
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6	XP_022112029.1	coiled-coil domain-containing protein 65-like isoform X2	225-547	Cluster-123424.0

- **Sequences Tab**

After the record is selected, it redirects you to “Sequences” tab and display protein sequences from Ophiroids repository. Furthermore, it allows to download result sequence in fasta file format.

Ophiroid DB

Enter Keyword & Hit Enter  
XP\_0221120  
Submit Search  
Clear

Link to Echino Dashboard  
Link to Echinoid Dashboard  
Link to BLAST Server

Click to download *Ophioderma brevispinum* data

Results Sequences

Allows to download result sequences in a fasta file format → Download Result Sequences

**BLAST Details-**  
 \* presequence protease, mitochondrial-like isoform X2 [*Acanthaster planci*]  
 \* Reference#: XP\_022112056.1  
 \* start-send: 33-1013

*Ophioderma brevispinum* ClusterID: Cluster-320771.3

```

ASALETAEAYPGQKMHGFTVRKVIIPPELYLTAVTLMDHTDGAKYLVHAREDSNNVFSVGFRTTPMDS TGVPHILEHTLTCGSQRYP CRDPFFKMLNRSLATFMNAWTSADYTHYFPSSQNPKDFSNLLSVYL
DAAF FPR LRELDFRQEGWRLENNQDPDPSPIIFKGVVFNEMKGAMTSPQIFALHCQNNLPGHTYSHNSGGDPLIPIHLMQQLKDFHATHYHPSNSRFFTYGDLPLEGHELAIQQALASFSPITPNTVEVP
NEARMTQPREKHVRCAPDPMADPEKQTTVSVSFLNLSLTDSEFGFTMSILSHLLVSGTSPFFYQALVQANIGSDYSVPLGYDGS TKDASFSVGLQGTREQEDVEPVKSIIEDTFKVVENGFEKERIDAVLHKI
EISQKHQTTTFGLQIASLMQSMHDETELADVLRVNRVDRFQACLADNPRFLQDXTEEYFLRNPHRLTLVHTPKEDYKDELQEEKRLLDSMVSSELQEDRRGTYAKGLELADEQDREEDVSVLPTLKVSDIE
PELKRAKLDKQSDGIHQCCQPTNGITYFRAVSTLRSVPDILLPYIPLFCGVITRFGAAMITFEHFAQREELKTTGGLGVGHACQDPNDVLSVEQGITLTSFSLDKNLEDMFQLWSDVFNPNLKMDRLLT
LVRMRASELAPMSPDNGHAYAMKHAAGSLLSPVGRITKEICGMAQVSMKRIAEASDLTETMEKIRQVSGLLNKNLRCALNSGPEFMDALRHLSFLGCLPGAARQETKRP LLTKIEDFCVSRTHFELPFP
VWYASRGVRAVSYTHADF AKLRILARLMSAKFLHREIREKGGYVSGATLGTGEGSKFYSYRDPNSLQTL EAFDRAVEWATEGYSQQDIDEAKLSVFSVAVDAP IAPSDKGMTLFTSHISDDMRQEQRQRMFAV
SQEDLQEVQRYLALGAQVDSLTL LGGQNTATASDKMKVFRES
  
```

#### 4. Sequenceserver for Basic Local Alignment Search Tool

Access Sequenceserver (Priyam *et al.* 2019) by clicking the “Link to BLAST Server” in the left pane or by type in the following URL: <https://echinodb.uncc.edu/sequenceserver/>

Ophiroid DB


Enter Keyword & Hit Enter  
description, reference# etc.  
Submit Search  
Clear

Link to Echino Dashboard  
Link to Echinoid Dashboard  
Link to BLAST Server

Click to download *Ophioderma brevispinum* data

Results Sequences

Transcriptome data from Mashanov, Akiona, Khoury, Ferrier, Reid, Machado, Zueva, and Janies. Active Notch signaling is required for arm regeneration in a brittle star. *PLoS one* 15, no. 3 (2020): e0232981. is served here. The data can be searched by keyword based on annotation by similarity to the *Strongylocentrotus purpuratus* genome.

 *Ophioderma brevispinum*

- Paste your query string [protein sequence(s)] in the text area to perform BLAST search.

The screenshot shows the SequenceServer 2.0.0.rc8 interface. At the top, there is a header with the logo and a 'Help & Support' link. Below the header is a large text area containing a protein sequence:
 

```
ASALETAEAYQPGQKMHGFTVRKVIIPVPELYLTAVTLPHDVTGAKYLHVAREDSNINVFVSGFRTTPMDSTGVPHILEHTTLCGSQRYPCRDPPFKMLNRSLATFMNAWITASDYTHYPPFSSQNPKDFSNLLSVYLDAAFPRLRELDQFQEGWRLNENNQDPS...
  KGVVFNEMKGAMTSPQIFALHCQNILLPGHYSHNSGGDPLHIPHLTWQQLKDFHATHYHPSNSRFFTYGDLPLEGHLEAIQQALASFSPTIPNTEVPNEARWTPQREKRVRCAPDPAADPEKQTTVSVSFLNLSLSDSFEFGTMSILSHLLVSGPTSPFYQ...
  QANIIGSDYSPVLGYDGSFKDASFSVGLQIRQEDVEPVKSIIEDTFKVVENGFEKERIDAVLHKIEISQKHQTTTFGLQLASLQSMIHDTLADVLRVIRNVRDFQACLADNPRFLQDKTEEYFLRNPHRLTLVMTPKEDYKDELQEEKRILDSMVELSQEDR...
  RGIYAKGLELADEQREEDVSVLPTLKVSDEIPELKRKALDFKQSDGIHVQCCQPTWINGIYFRAVSTLRSVPDDLPIYPLFCGVITRMAADMTFHEFAQREELKTGGLGVGHACQDPNDVLSVEQGITLTSFSLDKNLEDMFQLHSDVFNPNLKDMDRLTTLV...
  RMRASELAMSIPDMGHAYAMKHAGSLLSPVGRIKEICGGMAQVSMFKRIAEASDLTETMEKIRQVSGLLNKNDRCALNSGPEFDDALRHLQSFGLCPGAAQETKRPLLTKEIDFCVSQRTHFELPPVNYASRGVRAVSYTHADF AKLRI LARLMSAKFLHRE...
  IREKGGAYSGATLGTGSEFKFYSYRDPNSLQTL EAFDRAVEWAEIGSYSQQDIDEAKLSVFSAVDAP IAPSDKGMFTLSHISDDMRQEQRMFAVSQEDLQEVQRYLALGAQVDSLTL L GPQNTATASDKMKVFRS
```

 Below the text area, a blue box indicates 'Detected: amino-acid sequence(s)'. Underneath, there are two columns of database selection options:
 

- Nucleotide databases [Select all]**
  - Lytechinus\_variegatus\_Nucleotide\_Sequences
  - Ophioderma\_brevispinum\_Nucleotide\_Sequences
  - OrthoCluster\_Nucl\_Seqs
- Protein databases [Select all]**
  - Lytechinus\_variegatus\_Protein\_Sequences
  - Ophioderma\_brevispinum\_Protein\_Sequences
  - OrthoCluster\_Prot\_Seqs

 At the bottom, there is an 'Advanced parameters' field with the text 'eg: -evalue 1.0e-5 -num\_alignments 100', a 'BLAST' button, and a 'Open results in new tab' checkbox. A footer contains a citation: 'Please cite relevant data sources and: Priyam et al. (2019) Sequenceserver: a modern graphical user interface for custom BLAST databases.'

- Select database(s) to perform BLAST search against query sequence.

This screenshot shows the same SequenceServer 2.0.0.rc8 interface, but with different database selections. The protein sequence query is identical to the previous screenshot. In the 'Protein databases' section, the following options are selected:
 

- Lytechinus\_variegatus\_Protein\_Sequences
- Ophioderma\_brevispinum\_Protein\_Sequences
- OrthoCluster\_Prot\_Seqs

 The 'Advanced parameters' field now contains '-evalue 1e-5'. The 'BLAST' button is highlighted in blue. The footer remains the same, with the citation: 'Please cite relevant data sources and: Priyam et al. (2019) Sequenceserver: a modern graphical user interface for custom BLAST databases.'

## Sequenceserver Results

SequenceServer 2.0.0.rc8

[Help & Support](#)

BLASTP: 1 query, 2 databases

[Edit search](#) | [New search](#)

Download FASTA, XML, TSV

FASTA of all hits

FASTA of selected hit(s)

Alignment of all hits

Alignment of selected hit(s)

Standard tabular report

Full tabular report

Full XML report

SequenceServer 2.0.0.rc8 using BLASTP 2.9.0+, query submitted on 2021-09-30 01:49:53 UTC

Databases: Ophioderma\_brevispinum\_Protein\_Sequences, OrthoCluster\_Prot\_Seqs (1228855 sequences, 299839407 characters)

Parameters: eval=1e-05, matrix BLOSUM62, gap-open 11, gap-extend 1, filter F

Please cite: <https://doi.org/10.1093/molbev/msz185>

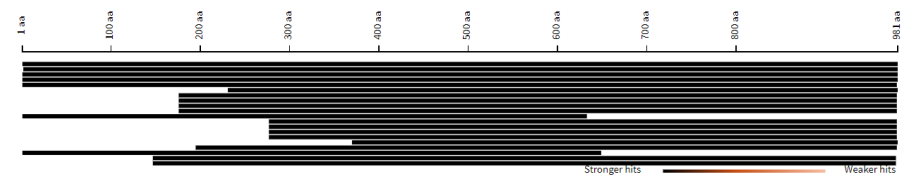
Queries and their top hits: chord diagram

Query= Query\_1

length: 981

Graphical overview of hits

[SVG](#) | [PNG](#)



View More

Length distribution of hits

Summary table of hits

#	Similar sequences	Query coverage (%)	Total score	E value	Identity (%)
1.	Cluster-320771.3	100	5313	0	100
2.	20:16798 OS=Psilaster charcoti	99	4616	0	85
3.	19:33421 OS=Peribolaster BJ19 folliculatus	100	4445	0	82
4.	10:37131 OS=Psilaster ochraceus	100	4414	0	81
5.	13:53487 OS=Oligometra serripinna	99	3316	0	60
6.	22:9616 OS=Remaster gourdoni	77	3297	0	80
7.	7:93851 OS=Pteraster tessellatus	82	3244	0	72

## Download FASTA Sequence, Alignment from a high scoring pair from SequenceServer

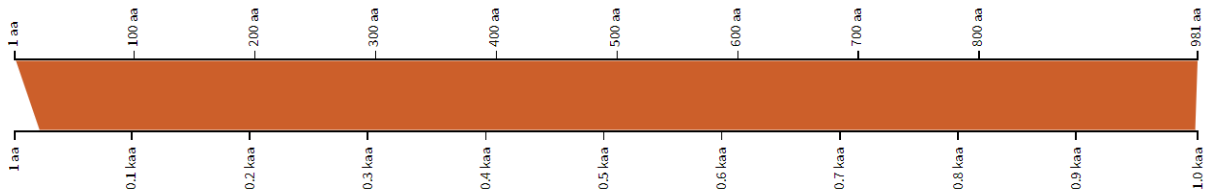
20:16798 OS=Psilaster charcoti

hit 2, length: 1,003

[Select](#) | [Sequence](#) | [FASTA](#) | [Alignment](#)

Graphical overview of aligning region(s)

[SVG](#) | [PNG](#)



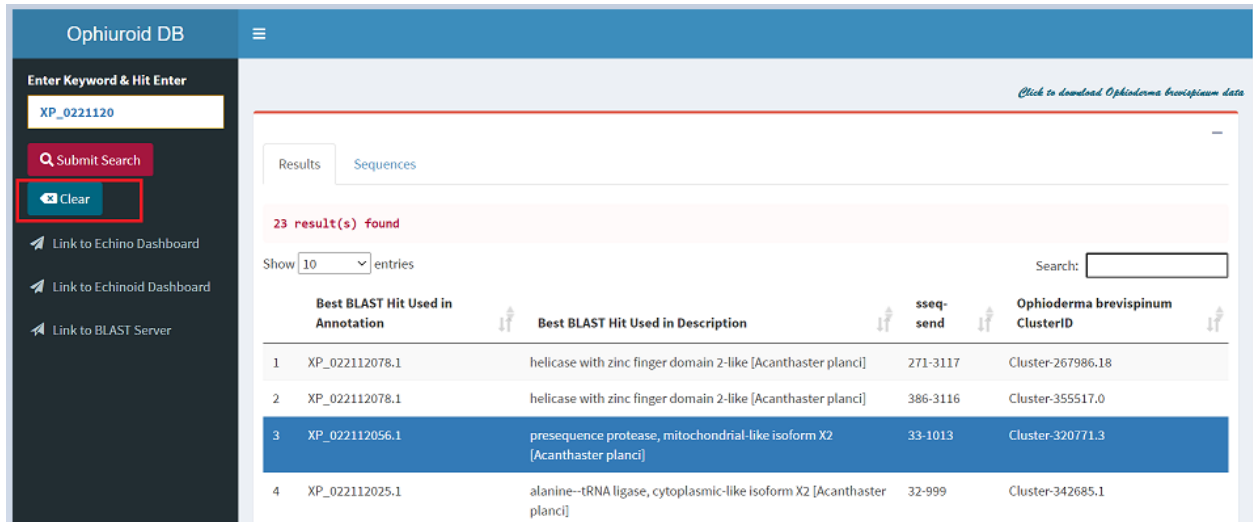
Score: 1782.69 (4616), E value: 0, Identity: 833/980 (85%), Positives: 907/980 (92.6%), Gaps: 0/980 (0%)

```

Query      2 SALETAEAYQPGQKMHGFTVRKVIPELYLTAVTLMHDVTGAKYLVHAREDSNNVFSVGFRTTPMDSTGVPHILEHTTLCGSQRYPCRDPFKMLNR 99
           SAL+TAE Y+PGQK+HGFTV KVIPVPELYLTAV L HDVT AKYLVHAREDSNNVFSV FRTTPMDSTGVPHILEHTTLCGSQRYPCRDPFKMLNR
Subject    22 SALKTAETEPGQKLHGFTVEKVIPELYLTAVILTHDVTAKYLVHAREDSNNVFSVGFRTTPMDSTGVPHILEHTTLCGSQRYPCRDPFKMLNR 119
Query     100 SLATFMNAWTASDYTYMPFSSQNPDKFNL LSVYLDAAFFPRLRELDLDFRQEGWRLLENENNQDPDPIIFKGVVFNEMKGGAMTSPEQIFALHCQNNLLP 197
           SL+TFMNAWTASDYTYMPFSSQNPDKF NLLSVYLDAAFFPRLRELDLDFRQEGWRLLENENNQDPDPIIFKGVVFNEMKGGAMTSPEQIFA HCQNNLLP
Subject    120 SLSTFMNAWTASDYTYMPFSSQNPDKFNL LSVYLDAAFFPRLRELDLDFRQEGWRLLENENNQDPDPIIFKGVVFNEMKGGAMTSPEQIFANHCQNNLLP 217
Query     198 GHTYSHNSGGDPLHIPHLTWQQLKDFHATHYHPSNSRFFTYGDLPLEGHLEAIQQQALASFSPITPNTVEVPNEARWTPREKHVRCAPDPMADPEKQ 295
           HTYSHNSGGDPLHIP L TWQQLK+FHATHYHPSNSRFFTYGDLPLEGHLEAIQQQAL SFSPI+P+TEVPNE RWTQPREKHV CAPDPMADPEKQ
Subject    218 SHTYSHNSGGDPLHIPRLTWQQLKEFHATHYHPSNSRFFTYGDLPLEGHLEAIQQQALASFSPISPDTEVPNETRWTQPREKHVHCAPDPMADPEKQ 315
Query     296 TTVSVSFLNLSLDSFEGFTMSILSHLLVSGPTSPFYQAL++ANIGSDYSPVLGYDGTGDASFSVGLQGIRQEDVEPVKSIIEDTFKVVENGFEKE 393
           TTVSVSFLNLSL DSFEGFT+SILSHLLVSGPTSPFYQAL++ANIGSDYSPVLGYDGTGDASFSVGLQGIR+EDVE VK II DTFKVVVE GFEKE
Subject    316 TTVSVSFLNLSLDSFEGFTLSILSHLLVSGPTSPFYQALLEANIGSDYSPVLGYDGTGDASFSVGLQGIREEDEVEKVGIIHDTFKVVETGFEKE 413
Query     394 RIDAVLHKIEISQKHQ+TTFGLQLIASLMQSWNHDELADVLRVNRNDRFQACIADNPRFLQDKTEEYFLRNPHRLTLVMTPKEDYKDELQDEEKRI 491
           RIDA+LHKIEISQKHQ+TTFGL L+ASLMQSWNH +LA ++RVN+NV+RFQACIADNPRFLQDKTEEYF N HRLTLVMTPKEDY ++DQEEKRI
Subject    414 RIDAILHKIEISQKHQSTTFGLNLVSLMQSWNHADLASIMRVNKNVERFQACIADNPRFLQDKTEEYFTSNHRLTLVMTPKEDYNETIDQEEKRI 511
  
```

## 5. Clear Search/Results in Ophiuroid DB

Go to the results tab and hit “Clear” button or “Delete” key to clear the search.



Ophiuroid DB

Enter Keyword & Hit Enter  
XP\_0221120

Submit Search

Clear

Link to Echino Dashboard

Link to Echinoid Dashboard

Link to BLAST Server

Click to download *Ophioderma brevispinum* data

Results Sequences

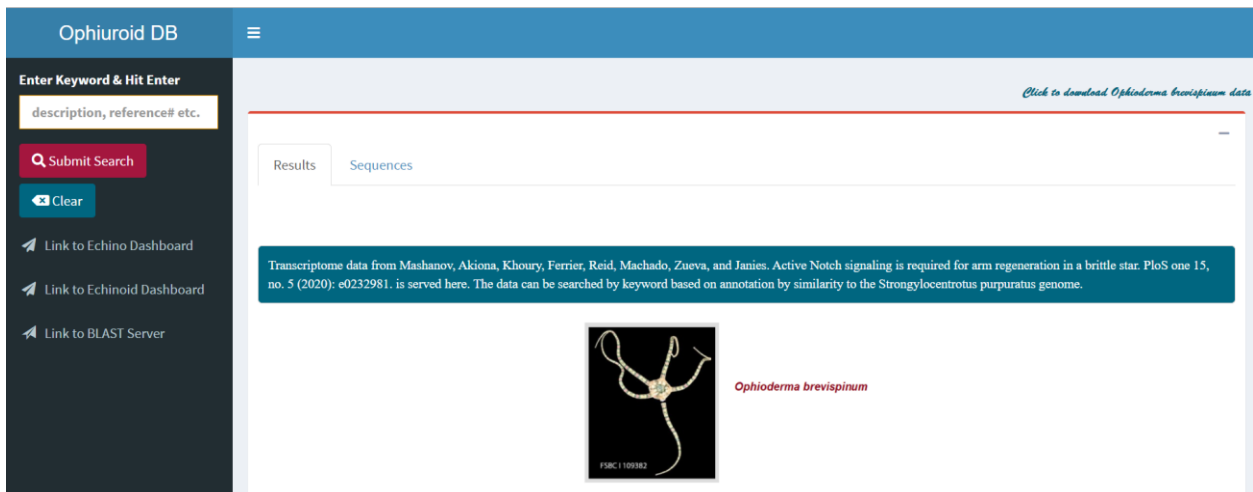
23 result(s) found

Show 10 entries

Search:

	Best BLAST Hit Used in Annotation	Best BLAST Hit Used in Description	sseq-send	Ophioderma brevispinum ClusterID
1	XP_022112078.1	helicase with zinc finger domain 2-like [Acanthaster planci]	271-3117	Cluster-267986.18
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3	XP_022112056.1	presequence protease, mitochondrial-like isoform X2 [Acanthaster planci]	33-1013	Cluster-320771.3
4	XP_022112025.1	alanine--tRNA ligase, cytoplasmic-like isoform X2 [Acanthaster planci]	32-999	Cluster-342685.1

➤ And, search will be cleared after the button is clicked or delete key is pressed.



Ophiuroid DB

Enter Keyword & Hit Enter  
description, reference# etc.

Submit Search

Clear

Link to Echino Dashboard


Link to Echinoid Dashboard

Link to BLAST Server

Click to download *Ophioderma brevispinum* data

Results Sequences

Transcriptome data from Mashanov, Akiona, Khoury, Ferrier, Reid, Machado, Zueva, and Janies. Active Notch signaling is required for arm regeneration in a brittle star. PLoS one 15, no. 5 (2020): e0232981. is served here. The data can be searched by keyword based on annotation by similarity to the Strongylocentrotus purpuratus genome.



*Ophioderma brevispinum*

## 6. Additional Links

Links in the left pane are provided to redirect users to “EchinoDB” or “EchinoidDB” page.

Ophiroid DB

Enter Keyword & Hit Enter

description, reference# etc.

Submit Search

Clear

Link to Echino Dashboard

Link to Echinoid Dashboard

Link to BLAST Server

Click to download *Ophioderma brevispinum* data

Results Sequences

Transcriptome data from Mashanov, Akiona, Khoury, Ferrier, Reid, Machado, Zueva, and Janies. Active Notch signaling is required for arm regeneration in a brittle star. *PLoS one* 15, no. 5 (2020): e0232981. is served here. The data can be searched by keyword based on annotation by similarity to the *Strongylocentrotus purpuratus* genome.

*Ophioderma brevispinum*

FSRC 1109382

## 7. References

Mashanov V, Akiona J, Khoury M, Ferrier J, Reid R, Machado DJ, Zueva O, Janies D. Active Notch signaling is required for arm regeneration in a brittle star. *PLoS One*. 2020; **15(5)**:e0232981; doi: 10.1371/journal.pone.0232981.

Priyam A, Woodcroft BJ, Rai V, Moghul I, Munagala A, Ter F, Chowdhary H, Pieniak I, Maynard LJ, Gibbins MA, Moon H. Sequenceserver: a modern graphical user interface for custom BLAST databases. *Molecular Biology and Evolution*. 2019; **36(12)**: 2922-4. doi: doi.org/10.1093/molbev/msz185.