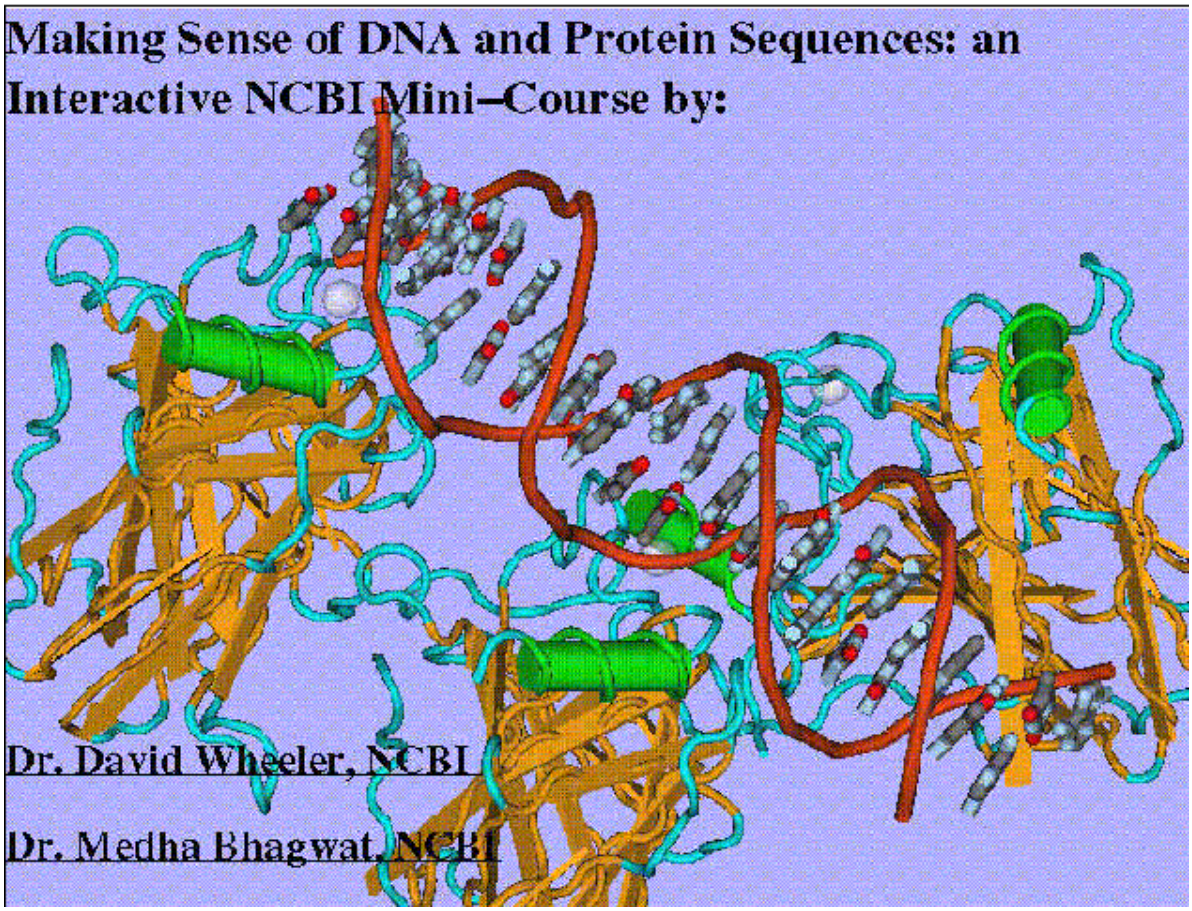
Making Sense of DNA and Protein Sequences: an Interactive NCBI Mini–Course by:



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Introduction:

In this course (http://www.ncbi.nlm.nih.gov/Class/minicourses/), we will first try to make sense of the DNA sequence by determining whether it encodes for a protein. If it does, then we will use this protein sequence to search for the presence of any motifs or structural domains present in it and also to predict its function. Finally, we will map the protein sequence onto the structure of a protein with similar sequence.

We recommend beginning with the uncharacterized *Drosophila melanogaster* genomic sequence from the GenBank record AE003584 found in the first electronic notebook, however, you can use another uncharacterized *Drosophila melanogaster* genomic sequence by choosing another notebook from the list below.

Electronic Notebook for Protein Sequence Analysis

The electronic notebook is a tutorial and analysis web-form consisting of a set of links to protein analysis tools combined with areas into which results and personal notes can be recorded. All the analysis tools open into a second "tools" window from which the results of an analysis can be pasted into the electronic notebook. The "Cheat now!" links open a third window in which a complete set of results have already been recorded. The electronic notebook can also be used to analyze a new DNA sequence by substituting the new sequence the original sequence found in the DNA sequence text area. The electronic notebooks used in this course are publicly accessible over the internet.

URLs Used:

1. **Class Page:** http://www.ncbi.nlm.nih.gov/Class/minicourses/
2. **GenScan:** http://genes.mit.edu/GENSCAN.html
3. **ScanProsite:** http://www.expasy.org/tools/scanprosite/
4. **BLASTP:** http://www.ncbi.nlm.nih.gov/BLAST
5. **COGs:** http://www.ncbi.nlm.nih.gov/COG/old/
6. **MultAlin:** http://prodes.toulouse.inra.fr/multalin/multalin.html
7. **CDD:** http://www.ncbi.nlm.nih.gov/Structure/cdd/wrpsb.cgi

NoteBooks:

http://www.ncbi.nlm.nih.gov/Class/minicourses/x1a.html
http://www.ncbi.nlm.nih.gov/Class/minicourses/x2a.html

Outline

Making Sense of DNA and Protein Sequences
Eukaryotic DNA query (Drosophila genome)
Predict coding region/exons (GenScan)
Obtain protein product (GenScan)
Identify motif/site (ScanProsite)
Search for similar sequences (BLASTp)
Predict function (COG)
Perform multiple sequence alignment (Multalin)
Obtain 3-D structural template (CDD)

To identify any exons in the DNA sequence and generate a predicted protein sequence, click here:

GenScan

Paste your DNA sequence into the GenScan input window. Press the *"Run Genscan"* button. Select the protein translation with the highest exon P–values and paste this FASTA formatted output into your notebook.

Protein Sequence from Genscan

The New GENSCAN Web Server at MIT

Identification of complete gene structures in genomic DNA

```
                \\|//
                (o o)
-. .-.   .-oOOo~(_)~oOOo-.   .-. .-.   .-. .-.   .-. .-.   .-. .-.   .-. .-.   .-. .-.   .-. .-.   .-
||X|||\ /|||X|||\ /|||X|||\ /|||X|||\ /|||X|||\ /|||X|||\ /|||X|||\ /|||X|||\ /|||X|||\ /|||X|||\ /||
|/ \|||X|||/ \|||X|||/ \|||X|||/ \|||X|||/ \|||X|||/ \|||X|||/ \|||X|||/ \|||X|||/ \|||X|||/ \|||X|||/
'   `-' `-'   `-' `-'   `-' `-'   `-' `-'   `-' `-'   `-' `-'   `-' `-'   `-' `-'   `-' `-'   `-' `-'
```

For information about Genscan, click here

This server provides access to the program Genscan for predicting the locations and exon-intron structures of genes in genomic sequences from a variety of organisms.

This server can accept sequences up to 1 million base pairs (1 Mbp) in length. If you have trouble with the web server or if you have a large number of sequences to process, request a local copy of the program (see instructions at the bottom of this page) or use the GENSCAN email server. If your browser (*e.g.*, Lynx) does not support file upload or multipart forms, use the older version.

Organism: Vertebrate Suboptimal exon cutoff (optional): 1.00

Sequence name (optional):

Print options: Predicted peptides only

Upload your DNA sequence file (one-letter code, upper or lower case, spaces/numbers ignored):

Browse...

Or paste your DNA sequence here (one-letter code, upper or lower case, spaces/numbers ignored):

```
   239041 gctcctgtct gaacgatcca gcgcgatgtt gatcaccgcc ttgttgtcat
catccacaat
   239101 gatggtgacg ttgacatggg ttttgttgcc gtaattgagg cgcctgaagt
ggaagtccct
   239161 atgcagaaac ttcggatgga tgttgcactc cagatgctga ttgctaaaac
gaaagctgcc
   239221 aaagctcagg accatggctt ggatgactcc cgaagctccc gctcgaataa
gattgtggca
   239281 gccctgtttc tccaacgtta gcatccacga cgtaaccagg gagttaagct
gctgaagatt
   239341 agacatctcg cgccaaagat tctccgcctg cagagtgtga tacgaatcgt
agcagccttc
```

To have the results mailed to you, enter your email address here (optional):

Run GENSCAN Clear Input

GENSCAN 1.0 Date run: 1-Oct-107 Time: 13:14:52

Sequence 13:14:50 : 5100 bp : 46.29% C+G : Isochore 2 (43 - 51 C+G%)

Parameter matrix: HumanIso.smat

Predicted genes/exons:

Gn.Ex	Type	S	.Begin	...End	.Len	Fr	Ph	I/Ac	Do/T	CodRg	P....	Tscr..
1.01	Sngl	+	27	458	432	2	0	48	49	383	0.447	24.68
1.02	PlyA	+	489	494	6							1.05
2.00	Prom	+	830	869	40							-6.86
2.01	Init	+	1002	1069	68	2	2	53	89	83	0.970	3.88
2.02	Intr	+	2549	2708	160	2	1	72	105	284	0.980	28.49
2.03	Intr	+	2771	2872	102	1	0	10	86	251	0.999	17.47
2.04	Intr	+	2935	3183	249	0	0	73	100	586	0.999	55.93
2.05	Term	+	3253	3948	696	0	0	90	49	1324	0.999	122.25
2.06	PlyA	+	4120	4125	6							1.05
3.04	PlyA	-	4162	4157	6							-0.45
3.03	Term	-	4448	4261	188	0	2	37	42	95	0.922	-2.55
3.02	Intr	-	4635	4511	125	2	2	44	90	91	0.949	5.13
3.01	Init	-	5046	4694	353	0	2	66	43	485	0.897	38.43

Click here to view a PDF image of the predicted gene(s)

Click here for a PostScript image of the predicted gene(s)

Predicted peptide sequence(s):

```
>13:14:50|GENSCAN_predicted_peptide_1|143_aa
MPRTLPWTTVFTAVASSARAKSMEKLTVVFLLRMHSALVVSQPSMATRVNLPVFDPQSLN
SRAPAKTTSAAQAITAYLSIFFHLIELQGKRIGWLFRWLSPLSASSQRYESTKSGESPKT
TQSFRMNGKQLRAATQKKAFFDD

>13:14:50|GENSCAN_predicted_peptide_2|424_aa
MSQICKRGLLISNRLAPAALRCKSTWFSEVQMGPPDAILGVTEAFKKDTNPKKINLGAGA
YRDDNTQPFVLPSVREAEKRVVSRSLDKEYATIIGIPEFYNKAIELALGKGSKRLAAKHN
VTAQSISGTGALRIGAAFLAKFWQGNREIYIPSPSWGNHVAIFEHAGLPVNRYRYYDKDT
CALDFGGLIEDLKKIPEKSIVLLHACAHNPTGVDPTLEQWREISALVKKRNLYPFIDMAY
QGFATGDIDRDAQAVRTFEADGHDFCLAQSFAKNMGLYGERAGAFTVLCSDEEEAARVMS
QVKILIRGLYSNPPVHGARIAAEILNNEDLRAQWLKDVKLMADRIIDVRTKLKDNLIKLG
SSQNWDHIVNQIGMFCFTGLKPEQVQKLIKDHSVYLTNDGRVSMAGVTSKNVEYLAESIH
KVTK

>13:14:50|GENSCAN_predicted_peptide_3|221_aa
MSNLQQLNSLVTSWMLTLEKQGCHNLIRAGASGVIQAMVLSFGSFRFSNQHLECNIHPKF
LHRDFHFRRLNYGNKTHVNVTIIVDDDNKAVINIALDRSDRSYYACDGGCLDEPVLLTQN
RRQFPVKLTEPLTAILYITEDKQHMEELHHAIHVKEVVEAPAHEQHLIALHRHGHQLGGL
PTLFWVSVCAIIIVFHIFLCKLIIKEYCEPSDKLRYRYNKP
```

To scan the protein sequence for the occurrence of motifs/patterns found in the PROSITE database, use:

ScanProsite

Paste the protein sequence from GenScan into the ScanProsite input box and press the *"Start the Scan"* button. Paste the ScanProsite hit into your notebook. To see the Prosite summary for the hit, click on the PDOCxxxx number.

Hit from ScanProsite

Prosite pattern

Cheat Now!

Home | **ScanProsite** | ProRule | Documents | Downloads | Links

ScanProsite

The ScanProsite tool [Help / Commercial users] allows to scan protein sequence(s) (either from UniProt Knowledgebase (Swiss-Prot/TrEMBL) or PDB or provided by the user) for the occurrence of patterns, profiles and rules (motifs) stored in the PROSITE database, or to search protein database(s) for hits by specific motif(s) [Reference / Download ps_scan, the standalone version]. The program PRATT can be used to generate your own patterns. You may either:

- Enter one or more PROSITE accession numbers and/or patterns [1 by line] to search the UniProt Knowledgebase (Swiss-Prot/TrEMBL) and/or PDB databases, **OR**
- Enter one or more sequences [raw, Swiss-Prot or fasta format] and/or UniProt Knowledgebase (Swiss-Prot/TrEMBL) accession numbers and/or PDB accession numbers [1 by line] to be scanned with all patterns, profiles, rules in PROSITE, **OR**
- Fill in both fields to find all occurrences of specified motifs in specified sequences.

Protein(s) to be scanned:

Enter one or more Swiss-Prot/TrEMBL accession number(s) [AC] (e.g. **P00747**) and/or sequence identifier(s) [ID] (e.g. **ENTK_HUMAN**), and/or PDB identifier, and/or paste **your own protein sequence(s)** in the box below:
(leave this box blank to scan PROSITE entrie(s) against selected protein databases)

```
MSQICKRGLLISNRLAPAALRCKSTWFSEVQMGPPDAILG
YRDDNTQPFVLPSVREAEKRVVSRSLDKEYATIIGIPEFYI
VTAQSISGTGALRIGAAFLAKFWQGNREIYIPSPSWGNHV
CALDFGGLIEDLKKIPEKSIVLLHACAHNPTGVDPTLEQW
QGFATGDIDRDAQAVRTFEADGHDFCLAQSFAKNMGLYGE
QVKILIRGLYSNPPVHGARIAAEILNNEDLRAQWLKDVKL
SSQNWDHIVNQIGMFCFTGLKPEQVQKLIKDHSVYLTNDG
KVTK
```

Clear

General options:

- ☑ Exclude motifs with a high probability of occurrence
- ☐ Show low level score
- ☐ Do not scan profiles [User Manual]

Show only sequences with at least [ ] hit(s)
Maximum of matched sequences [1000]
Output format [Graphical pairwise view]
☐ Retrieve complete sequences
Your e-mail (optional): [ ] (will send results by e-mail)

START THE SCAN | reset

PROSITE pattern(s)/profile(s) to scan for:

Enter one or more PROSITE accession number(s) (e.g. **PS50240**), and/or identifier(s) (e.g. **CHEB**), and/or type **your pattern(s)** in PROSITE format in the box below:
(leave this box blank to scan sequence(s) against the entire PROSITE database)

and specify your search limits (only used if no protein data specified) :

- **Protein database(s):** ☑ Swiss-Prot ☐ TrEMBL ☐ PDB databases
  ☑ including splice variants
  randomize databases [no] (only with patterns, see help)
- Taxonomic lineage (OC) / species (OS) filter: [ ]
  (see NEWT Taxonomy ; separate multiple taxa/species with a semicolon, e.g. *Eukaryota; Escherichia coli;* . Does not work on PDB sequences.)
- Description (DE) filter: [ ] e.g. *protease*

pattern options:

Allow at most [1] X sequence characters to match a conserved position in the pattern
match mode [greedy, overlaps, no includes] (for patterns, see help)

Home ScanProsite Prol

ScanProsite Results Viewer

This view shows ScanProsite results together with ProRule-based predicted intra-domain features (help).

Hits for all PROSITE (release 20.19) motifs on sequence 13-14-50-GENSCAN_predicted_peptide_2-424_aa :

found: 1 hit in 1 sequence

13-14-50-GENSCAN_predicted_peptide_2-424_aa (424 aa)

```
MSQICKRGLLISNRLAPAALRCKSTWFSEVQMGPPDAILGVTEAFKKDTNPKKINLGAGAYRDDNT
QPFVLPSVREAEKRVVSRSLDKEYATIIGIPEFYNKAIELALGKGSKRLAAKHNVTAQSISGTGAL
RIGAAFLAKFWQGNREIYIPSPSWGNHVAIFEHAGLPVNRYRYYDKDTCALDFGGLIEDLKKIPEK
SIVLLHACAHNPTGVDPTLEQWREISALVKKRNLYPFIDMAYQGFATGDIDRDAQAVRTFEADGHD
FCLAQSFAKNMGLYGERAGAFTVLCSDEEEAARVMSQVKILIRGLYSNPPVHGARIAAEILNNEDL
RAQWLKDVKLMADRIIDVRTKLKDNLIKLGSSQNWDHIVNQIGMFCFTGLKPEQVQKLIKDHSVYL
TNDGRVSMAGVTSKNVEYLAESIHKVTK
```

ruler: 1 100 200 300 400 500 600 700 800 900 1000

hits by patterns: [1 hit (by 1 pattern) on 1 sequence]

Hits by PS00105 **AA_TRANSFER_CLASS_1** *Aminotransferases class-I pyridoxal-phosphate attachment site* :

13-14-50-GENS~ (424 aa)

270 - 283: SFAKnmGLyGERAG

Legend:

disulfide bridge active site other 'ranges' other sites

horizontal scaling: 0.6

do not show text labels:

do not show sites in hits:

do not show ranges in hits:

redisplay

Aminotransferases class-I pyridoxal-phosphate attachment site

Description:

Aminotransferases share certain mechanistic features with other pyridoxal-phosphate dependent enzymes, such as the covalent binding of the pyridoxal-phosphate group to a lysine residue. On the basis of sequence similarity, these various enzymes can be grouped [1,2] into subfamilies. One of these, called class-I, currently consists of the following enzymes:

- Aspartate aminotransferase (AAT) (EC 2.6.1.1). AAT catalyzes the reversible transfer of the amino group from L-aspartate to 2-oxoglutarate to form oxaloacetate and L-glutamate. In eukaryotes, there are two AAT isozymes: one is located in the mitochondrial matrix, the second is cytoplasmic. In prokaryotes, only one form of AAT is found (gene aspC).
- Tyrosine aminotransferase (EC 2.6.1.5) which catalyzes the first step in tyrosine catabolism by reversibly transferring its amino group to 2- oxoglutarate to form 4-hydroxyphenylpyruvate and L-glutamate.
- Aromatic aminotransferase (EC 2.6.1.57) involved in the synthesis of Phe, Tyr, Asp and Leu (gene tyrB).
- 1-aminocyclopropane-1-carboxylate synthase (EC 4.4.1.14) (ACC synthase) from plants. ACC synthase catalyzes the first step in ethylene biosynthesis.
- Pseudomonas denitrificans cobC, which is involved in cobalamin biosynthesis.
- Yeast hypothetical protein YJL060w.

The sequence around the pyridoxal-phosphate attachment site of this class of enzyme is sufficiently conserved to allow the creation of a specific pattern.

Last update:
April 2006 / Pattern and text revised.

Technical section:

PROSITE method (with tools and information) covered by this documentation:

AA_TRANSFER_CLASS_1, PS00105; **Aminotransferases class-I pyridoxal-phosphate attachment site** (PATTERN)

Consensus pattern:	**[GS] - [LIVMFYTAC] - [GSTA] - K - x(2) - [GSALVN] - [LIVMFA] - x - [GNAR] - {V} - R - [LIVMA] - [GA]** *K is the pyridoxal-P attachment site*
Sequences known to belong to this class detected by the pattern:	ALL
Other sequence(s) detected in Swiss-Prot:	1

To search for proteins with similar sequences, use BLAST:

BLAST

Run a BLASTp search against the Swiss-Prot database by pasting the protein sequence from GenScan into the input box on the BLASTp page. Choose the SwissProt database from the database listbox, then press the ***"BLAST"*** button. Format your results as "Flat-query anchored with dots for identities" by selecting the "Reformat these Results" link on the results page and paste this alignment into your notebook.

BLASTP Alignment (against SwissProt)

BLAST Basic Local Alignment Search Tool

Home | Recent Results | Saved Strategies | Help

NCBI/ BLAST/ blastp suite: BLASTP programs search protein databases using a protein query. more... Reset page Bookmark

Enter Query Sequence

Enter accession number, gi, or FASTA sequence Clear

```
CALDFGGLIEDLKKIPEKSIVLLHACAHNPTGVDPTLEQWREISALVKKRNLYPFIDMAY
QGFATGDIDRDAQAVRTFEADGHDFCLAQSFAKNMGLYGERAGAFTVLCSDEEEAARVMS
QVKILIRGLYSNPPVHGARIAAEILNNEDLRAQWLKDVKLMADRIIDVRTKLKDNLIKLG
SSQNWDHIVNQIGMFCFTGLKPEQVQKLIKDHSVYLTNDGRVSMAGVTSKNVEYLAESIH
KVTK
```

Query subrange

From

To

Or, upload file Browse...

Job Title

Enter a descriptive title for your BLAST search

Choose Search Set

Database: Swissprot protein sequences(swissprot)

Organism Optional

Enter organism common name, binomial, or tax id. Only 20 top taxa will be shown.

Entrez Query Optional

Enter an Entrez query to limit search

Program Selection

Algorithm

- blastp (protein-protein BLAST)
- PSI-BLAST (Position-Specific Iterated BLAST)
- PHI-BLAST (Pattern Hit Initiated BLAST)

Choose a BLAST algorithm

BLAST Search database swissprot using Blastp (protein-protein BLAST)

Show results in a new window

BLAST Basic Local Alignment Search Tool

Home | Recent Results | Saved Strategies | Help

NCBI/ BLAST/ blastp/ Formatting Results - F02W3DN601R [Reformat these Results] [Edit and Resubmit] [Sign in above to save your search strategy]

Job Title: 13:14:50|GENSCAN_predicted_peptide_2|424_aa

BLASTP 2.2.17 (Aug-26-2007)

Reference:
Altschul, Stephen F., Thomas L. Madden, Alejandro A. Schäffer, Jinghui Zhang, Zheng Zhang, Webb Miller, and David J. Lipman (1997), "Gapped BLAST and PSI-BLAST: a new generation of protein database search programs", Nucleic Acids Res. 25:3389-3402.

RID: F02W3DN601R

Database: Non-redundant SwissProt sequences
252,910 sequences; 95,429,281 total letters

BLAST Basic Local Alignment Search Tool

Home | Recent Results | Saved Strategies | Help

NCBI/ BLAST/ Format Request

Query lcl|30322 13:14:50|GENSCAN_predicted_peptide_2|424_aa(424 letters)

Database swissprot

Job title 13:14:50|GENSCAN_predicted_peptide_2|424_aa

Request ID F02W3DN601R View report Show results in a new window

Format

Show Alignment as HTML Advanced View Reset form to defaults

Alignment View Flat query-anchored with dots for identities

Display Graphical Overview Linkout Sequence Retrieval NCBI-gi

Masking Character: Lower Case Masking Color: Grey

Limit results Descriptions: 100 Graphical overview: 100 Alignments: 100

Organism Type common name, binomial, taxid, or group name. Only 20 top taxa will be shown.
Enter organism name or id--completions will be sugges

Entrez query:

Expect Min: 0 Expect Max: 10

Format for PSI-BLAST with inclusion threshold: 0.001

BLAST — Basic Local Alignment Search Tool

Home | Recent Results | Saved Strategies | Help

NCBI/ BLAST/ blastp/ Formatting Results - F02W3DN601R [Reformat these Results] [Edit and Resubmit] [Sign in above to save your search strategy]

Job Title: 13:14:50|GENSCAN_predicted_peptide_2|424_aa

BLASTP 2.2.17 (Aug-26-2007)

Reference:
Altschul, Stephen F., Thomas L. Madden, Alejandro A. Schäffer, Jinghui Zhang, Zheng Zhang, Webb Miller, and David J. Lipman (1997), "Gapped BLAST and PSI-BLAST: a new generation of protein database search programs", Nucleic Acids Res. 25:3389-3402.

RID: F02W3DN601R

Database: Non-redundant SwissProt sequences
252,910 sequences; 95,429,281 total letters

If you have any problems or questions with the results of this search please refer to the **BLAST FAQs**
Taxonomy reports

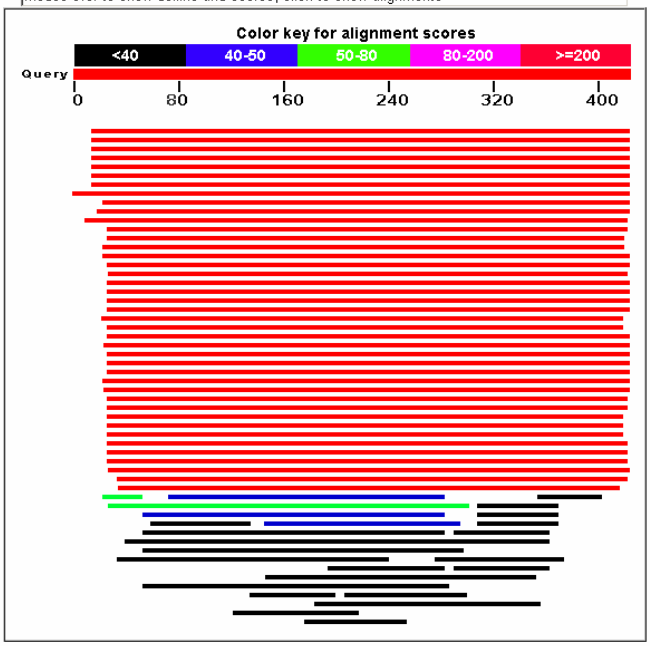
Query= 13:14:50|GENSCAN_predicted_peptide_2|424_aa
Length=424

http://www.ncbi.nlm.nih.gov/blast/Blast.cgi

NCBI Minicourses HomePage | http://www.ncbi.nl...nicourses/x1a.html | NCBI Blast:13:14:50|GENSCAN_pr... | PROSITE documentation PDOC00098

Distribution of 72 Blast Hits on the Query Sequence

Mouse-over to show defline and scores, click to show alignments

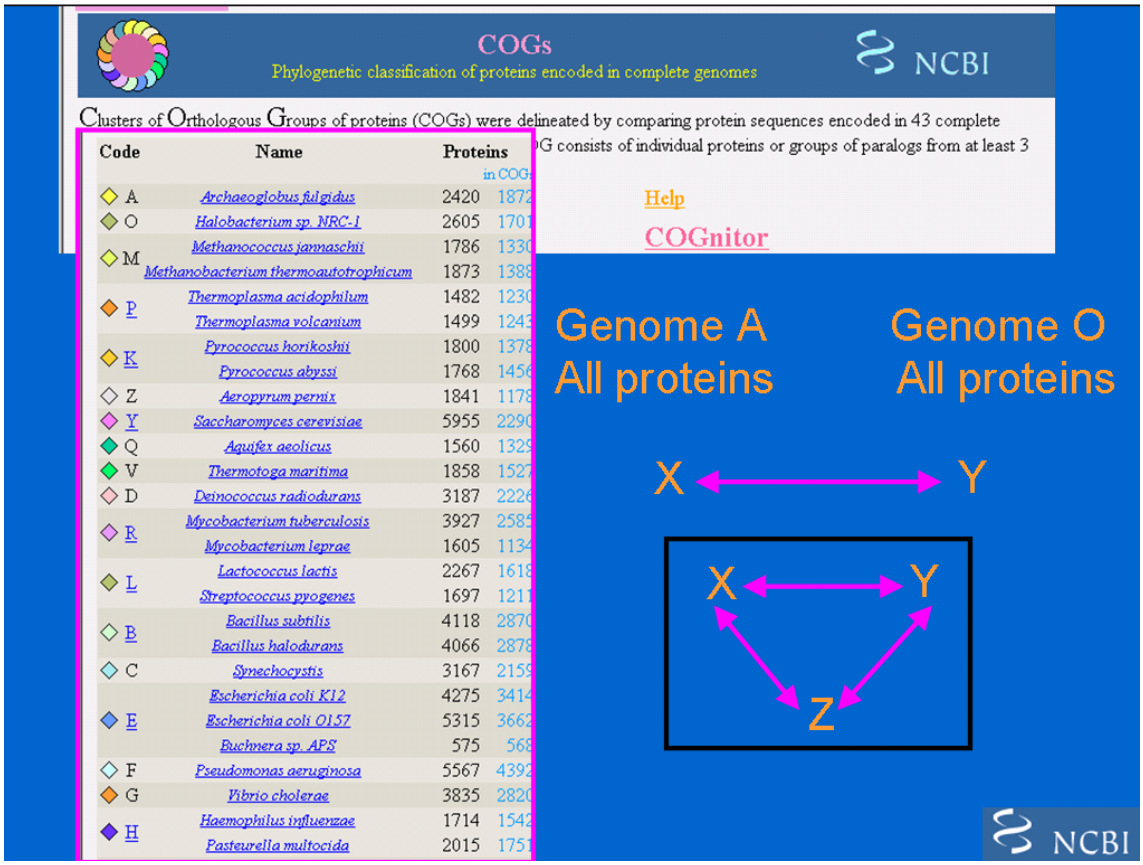


Distance tree of results NEW

Sequences producing significant alignments:		Score (Bits)	E Value	
gi|75042478|sp|Q5REB0|AATM PONPY	Aspartate aminotransferase, ...	545	2e-154	
gi|112983|sp|P00505|AATM HUMAN	Aspartate aminotransferase, mi...	543	4e-154	G
gi|112984|sp|P05202|AATM MOUSE	Aspartate aminotransferase, mi...	543	5e-154	G
gi|112987|sp|P00507|AATM RAT	Aspartate aminotransferase, mito...	543	7e-154	G
gi|75075926|sp|Q4R559|AATM MACFA	Aspartate aminotransferase, ...	542	1e-153	
gi|112985|sp|P00506|AATM PIG	Aspartate aminotransferase, mito...	538	2e-152	G
gi|1168261|sp|P12344|AATM BOVIN	Aspartate aminotransferase, m...	536	5e-152	G
gi|112981|sp|P00508|AATM CHICK	Aspartate aminotransferase, mi...	532	9e-151	G
gi|112982|sp|P08907|AATM HORSE	Aspartate aminotransferase, mi...	532	1e-150	
gi|1168256|sp|P46643|AAT1 ARATH	Aspartate aminotransferase, m...	429	1e-119	G
gi|2506178|sp|P28011|AAT1 MEDSA	Aspartate aminotransferase 1 (Tr	418	2e-116	
gi|1168258|sp|P46644|AAT3 ARATH	Aspartate aminotransferase, c...	405	2e-112	G
gi|21542386|sp|P46645|AAT2 ARATH	Aspartate aminotransferase, ...	405	2e-112	G
gi|112972|sp|P28734|AATC DAUCA	Aspartate aminotransferase, cytop	404	3e-112	
gi|584706|sp|P37833|AATC ORYSJ	Aspartate aminotransferase, cytop	401	3e-111	

```
24418724     273   ------V                                                  273

Query        251   ----DAQAVR------TFE---ADGH----D-FCL-AQ-SFAKNMGLYGERAGAFTVLC  289
75042478     257   ----..W...------H.I---EQ.I----N-V..-C.--.Y..........V....MV.  295
112983       257   ----..W...------H.I---EQ.I----N-V..-C.--.Y..........V....MV.  295
112984       257   ----..W...------H.I---EQ.I----N-V..-C.--.Y..........V.....V.  295
112987       257   ----..W...------H.I---EQ.I----N-V..-C.--.Y..........V.....V.  295
75075926     257   ----..W...------H.I---EQ.I----N-V..-C.--.Y..........V....MV.  295
112985       257   ----..W...------H.I---EQ.I----N-V..-C.--.Y..........V.....V.  295
1168261      257   ----..W...------H.I---EQ.I----N-V..-C.--.Y..........V.....V.  295
112981       250   ----..W.L.------H.I---EQ.I----.-VV.-S.--.Y................I.  288
112982       228   ----..W...------Y.I---EQ.I----N-V..-C.--.Y..........V....MV.  266
1168256      255   ----..KSI.------I.L---E...----H-IGI-S.--.Y........Q.V.CLS...  293
2506178      242   ----...P..------L.V---...G----E-LLV-..--.Y..........V..LSIVS  280
1168258      273   ----..KPI.------M.V---...G----E-CLV-..--.Y..........V..LSIV.  311
21542386     229   ----...S..------..V---...G----E-CLI-..--.Y..........V..LSIV.  267
112972       229   ----...S..------I.V---...G----E-CLA-..--.Y..........V..LSIV.  267
584706       231   ----...S..------M.V---...G----E-LLM-..--.Y..........V..LSIV.  269
112971       236   ----..W...------Y.V---SE.F----E-LFC-..--..S..F...N..V.NLS.VG  274
21542387     227   ----......------M.V---...G----E-CLI-..--.Y..........I.SL.IV.  265
75041219     237   ----..W.I.------Y.V---SE.F----E-.FC-..--..S..F...N..V.NL..VG  275
75076072     237   ----..W.I.------Y.V---SE.F----E-.FC-..--..S..F...N..V.NL..VG  275
5902703      237   ----..W.I.------Y.V---SE.F----E-.FC-..--..S..F...N..V.NL..VG  275
20532373     276   ----..AS..------L.A---ER.M----E-.FV-..--.YS..L...A..I..IN.V.  314
112979       277   ----..AS..------L.V---.R.L----E-VLV-..--.YS..L...A..I..IN.IS  315
112976       237   ----..W.I.------Y.V---SE.F----E-LFC-..--..S..F...N..V.NL..VA  275
122065118    237   ----..W.I.------Y.V---SE.F----E-LFC-..--..S..F...N..V.NL..VG  275
126302508    237   ----..W...------Y.V---SE.F----E-LFC-..--..S..F...N..V.NL..VA  275
122065117    237   ----..W.I.------Y.V---SE.F----E-LFC-..--..S..F...N..V.NL..VA  275
112975       237   ----..W.I.------Y.V---SE.F----E-LFC-..--..S..F...N..V.NL..VG  275
1703040      230   ----..Y...------LGVEKLSTVS----P-VFV-C.--.....A.M....V.C.HLAL  271
2492843      229   ----..W.I.------Y.V---DQ.M----E-MVV-S.--.....F...N..V.NL..VV  267
1168262      224   ----..YGL.------A.A---.NHK----E-LLV-.S--..S..F...N..V....LVA  262
```


COGs
Phylogenetic classification of proteins encoded in complete genomes
NCBI
Clusters of Orthologous Groups of proteins (COGs) were delineated by comparing protein sequences encoded in 43 complete
G consists of individual proteins or groups of paralogs from at least 3
Code
Name
Proteins
in COG
A Archaeoglobus fulgidus 2420
O Halobacterium sp. NRC-1 2605
M Methanococcus jannaschii 1786
Methanobacterium thermoautotrophicum 1873
P Thermoplasma acidophilum 1482
Thermoplasma volcanium 1499
K Pyrococcus horikoshii 1800
Pyrococcus abyssi 1768
Z Aeropyrum pernix 1841
Y Saccharomyces cerevisiae 5955
Q Aquifex aeolicus 1560
V Thermotoga maritima 1858
D Deinococcus radiodurans 3187
R Mycobacterium tuberculosis 3927
Mycobacterium leprae 1605
L Lactococcus lactis 2267
Streptococcus pyogenes 1697
B Bacillus subtilis 4118
Bacillus halodurans 4066
C Synechocystis 3167
E Escherichia coli K12 4275
Escherichia coli O157 5315
Buchnera sp. APS 575
F Pseudomonas aeruginosa 5567
G Vibrio cholerae 3835
H Haemophilus influenzae 1714
Pasteurella multocida 2015
Help
COGnitor
Genome A
All proteins
Genome O
All proteins
X
Y
X
Y
Z
NCBI

To search against the COGs database, click here:

COGs

Clusters of Orthologous Groups of proteins (COGs) were delineated by comparing protein sequences encoded in 43 complete genomes, representing 30 major phylogenetic lineages. Each COG consists of individual proteins or groups of paralogs from at least 3 lineages and thus corresponds to an ancient conserved domain. Use the COGnitor to compare the protein sequence to the COGs database.

Paste the FASTA formatted protein sequence from GenScan into the COGnitor input box and press the ***"compare to COGs"*** button. Click on the link to the highest-scoring COG and click on the disk icon to save the sequences in the COG to a local file on your desktop to be used as input to Multalin below. Drag this file from your desktop onto your "tools" browser window to display the sequences. Then copy and paste these into your notebook under "COGs FASTA Sequences".

COGs FASTA Sequences

Updated version

COGs

Phylogenetic classification of proteins encoded in complete genomes

Clusters of Orthologous Groups of proteins (COGs) were delineated by comparing protein sequences encoded in 43 complete gen representing 30 major phylogenetic lineages. Each COG consists of individual proteins or groups of paralogs from at least 3 lineages corresponds to an ancient conserved domain.

Science 1997 Oct 24;278(5338):631-7,
Nucleic Acids Res 2001 Jan 1; 29(1):22-28.

Help

COGnitor

Protein/Gene name:

Text search:

Code	Name	Proteins	in COGs
A	*Archaeoglobus fulgidus*	2420	1872
O	*Halobacterium sp. NRC-1*	2605	1701
M	*Methanococcus jannaschii*	1786	1330
	Methanobacterium thermoautotrophicum	1873	1388
P	*Thermoplasma acidophilum*	1482	1230
	Thermoplasma volcanium	1499	1243
K	*Pyrococcus horikoshii*	1800	1378
	Pyrococcus abyssi	1768	1456
Z	*Aeropyrum pernix*	1841	1178
Y	*Saccharomyces cerevisiae*	5955	2290
Q	*Aquifex aeolicus*	1560	1329
V	*Thermotoga maritima*	1858	1527
D	*Deinococcus radiodurans*	3187	2226
R	*Mycobacterium tuberculosis*	3927	2585
	Mycobacterium leprae	1605	1134
L	*Lactococcus lactis*	2267	1618
	Streptococcus pyogenes	1697	1211
B	*Bacillus subtilis*	4118	2870
	Bacillus halodurans	4066	2878
C	*Synechocystis*	3167	2159

Principal component analysis of genomes

List of COGs

Distribution

Co-occurrences

Phylogenetic patterns

Phylogenetic patterns search

Functional categories

J K L

D O M N P T

G C E F H I Q

R S

Pathways and functional systems

FTP

COGnitor

Compare your sequence to COG database

NCBI

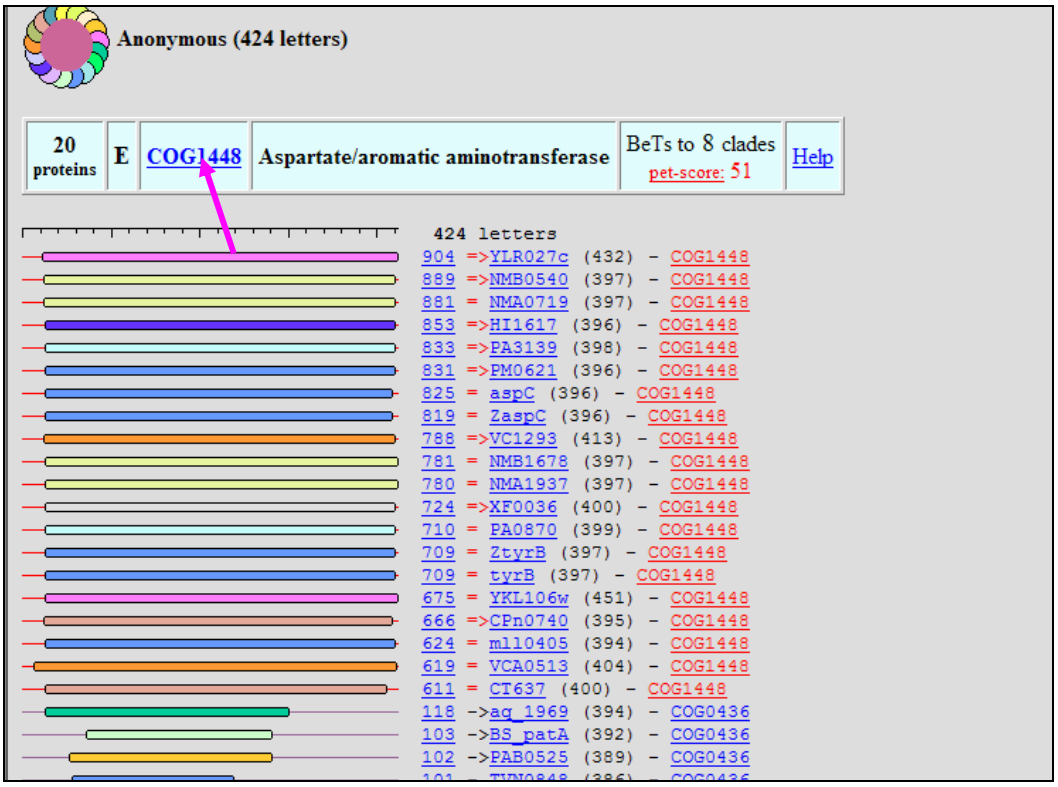
compare to COGs | Clear | BeTs to 3 clades

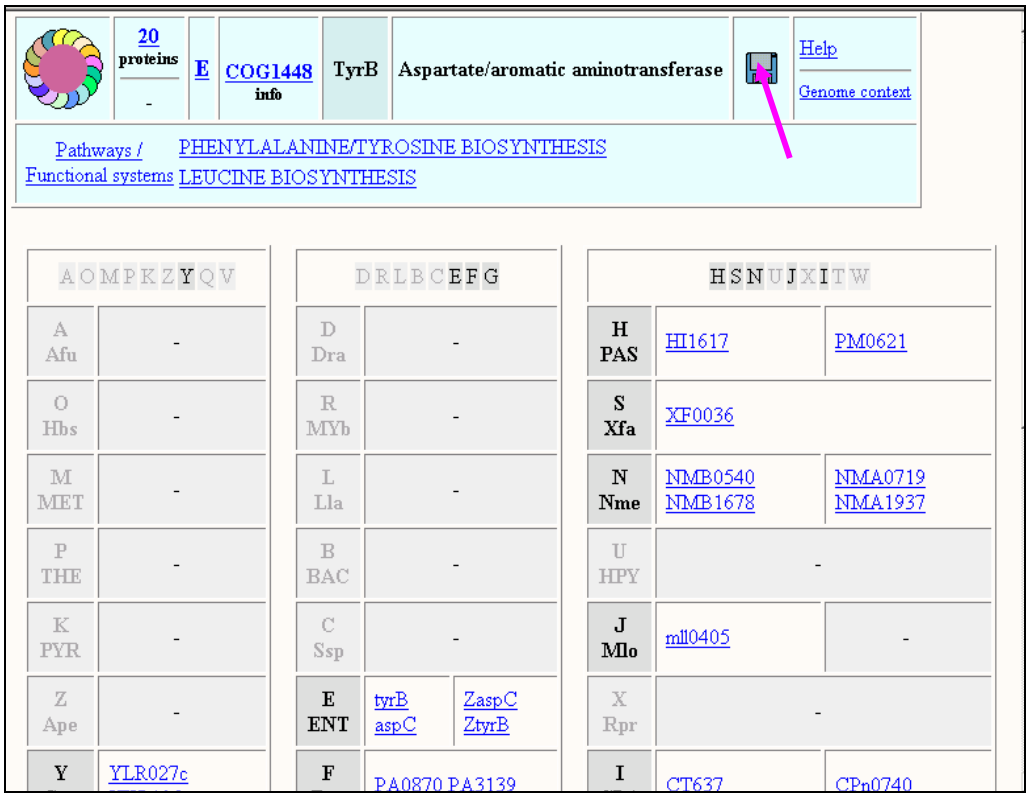
Help
Example

Paste your sequence and press the button above.

```
MSQICKRGLLISNRLAPAALRCKSTWFSEVQMGPPDAILGVTEAFKKDTNPKKINLGAGA
YRDDNTQPFVLPSVREAEKRVVSRSLDKEYATIIGIPEFYNKAIELALGKGSKRLAAKHN
VTAQSISGTGALRIGAAFLAKFWQGNREIYIPSPSWGNHVAIFEHAGLPVNRYRYYDKDT
CALDFGGLIEDLKKIPEKSIVLLHACAHNPTGVDPTLEQWREISALVKKRNLYPFIDMAY
QGFATGDIDRDAQAVRTFEADGHDFCLAQSFAKNMGLYGERAGAFTVLCSDEEEAARVMS
QVKILIRGLYSNPPVHGARIAAEILNNEDLRAQWLKDVKLMADRIIDVRTKLKDNLIKLG
SSQNWDHIVNQIGMFCFTGLKPEQVQKLIKDHSVYLTNDGRVSMAGVTSKNVEYLAESIH
KVTK
```

Skip low-complexity filtering


Anonymous (424 letters)
20 proteins
E
COG1448
Aspartate/aromatic aminotransferase
BeTs to 8 clades
pet-score: 51
Help
424 letters
904 =>YLR027c (432) - COG1448
889 =>NMB0540 (397) - COG1448
881 = NMA0719 (397) - COG1448
853 =>HI1617 (396) - COG1448
833 =>PA3139 (398) - COG1448
831 =>PM0621 (396) - COG1448
825 = aspC (396) - COG1448
819 = ZaspC (396) - COG1448
788 =>VC1293 (413) - COG1448
781 = NMB1678 (397) - COG1448
780 = NMA1937 (397) - COG1448
724 =>XF0036 (400) - COG1448
710 = PA0870 (399) - COG1448
709 = ZtyrB (397) - COG1448
709 = tyrB (397) - COG1448
675 = YKL106w (451) - COG1448
666 =>CPn0740 (395) - COG1448
624 = mll0405 (394) - COG1448
619 = VCA0513 (404) - COG1448
611 = CT637 (400) - COG1448
118 ->aq_1969 (394) - COG0436
103 ->BS_patA (392) - COG0436
102 ->PAB0525 (389) - COG0436


20 proteins
E
COG1448
info
TyrB
Aspartate/aromatic aminotransferase
Help
Genome context
Pathways / Functional systems
PHENYLALANINE/TYROSINE BIOSYNTHESIS
LEUCINE BIOSYNTHESIS
A O M P K Z Y Q V
A Afu -
O Hbs -
M MET -
P THE -
K PYR -
Z Ape -
Y YLR027c
D R L B C E F G
D Dra -
R MYb -
L Lla -
B BAC -
C Ssp -
E ENT tyrB aspC ZaspC ZtyrB
F PA0870 PA3139
H S N U J X I T W
H PAS HI1617 PM0621
S Xfa XF0036
N Nme NMB0540 NMB1678 NMA0719 NMA1937
U HPY -
J Mlo mll0405 -
X Rpr -
I CT637 CPn0740

To generate a multiple sequence alignment, use:

MultAlin

Paste the sequences from your best–hit COG, saved in your "COGs FASTA Sequences" notebook area, into the input box of Multalin. Also paste in the protein sequence derived from GenScan to include your unknown sequence in this alignment and press the ***"Start Multalin!"*** button. Display these results in text form by clicking on the "–Results as a text page (msf) " link. Paste this Multalin display into your notebook.

Multalin Alignment

MultAlin

Multiple sequence alignment by Florence Corpet

Published research using this software should cite:
"Multiple sequence alignment with hierarchical clustering"
F. CORPET, 1988, Nucl. Acids Res., 16 (22), 10881-10890

INRA Home page | INRA L.G.C.-Auzeville | MultAlin

Sequence data

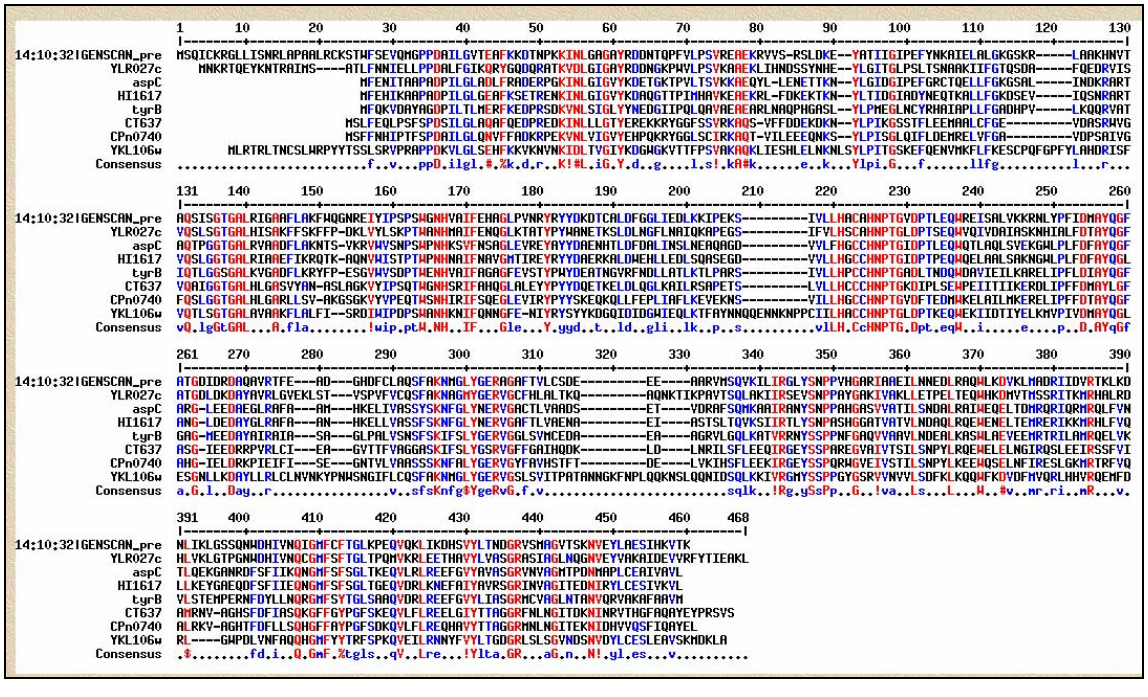
Cut and paste your sequences here below.

```
>08:28:21|GENSCAN_predicted_peptide_2|424_aa
MSQICKRGLLISNRLAPAALRCKSTWFSEVQMGPPDAILGVTEAFKKDTNPKKINLGAGA
YRDDNTQPFVLPSVREAEKRVVSRSLDKEYATIIGIPEFYNKAIELALGKGSKRLAAKHN
VTAQSISGTGALRIGAAFLAKFWQGNREIYIPSPSWGNHVAIFEHAGLPVNRYRYYDKDT
CALDFGGLIEDLKKIPEKSIVLLHACAHNPTGVDPTLEQWREISALVKKRNLYPFIDMAY
QGFATGDIDRDAQAVRTFEADGHDFCLAQSFAKNMGLYGERAGAFTVLCSDEEEAARVMS
QVKILIRGLYSNPPVHGARIAAEILNNEDLRAQWLKDVKLMADRIIDVRTKLKDNLIKLG
SSQNWDHIVNQIGMFCFTGLKPEQVQKLIKDHSVYLTNDGRVSMAGVTSKNVEYLAESIH
KVTK
>tyrB
MFQKVDAYAGDPILTLMERFKEDPRSDKVNLSIGLYYNEDGIIPQLQAVAEAEARLNAQPHGASLYLPME
```

(sample sequences)

or select a file: Browse... new

Sequence input format: Auto



```
      Consensus levels: high=90% low=50%
Consensus symbols:
 ! is anyone of IV
 $ is anyone of LM
 % is anyone of FY
 # is anyone of NDQEBZ//
```

```
                        251                                                300
14:13:11|GENSCAN_pre  PFIDMAYQGF ATGDIDRDAQ AVRTFE.... ..ADGHDFCL AQSFAKNMGL
             YLR027c  ALFDTAYQGF ATGDLDKDAY AVRLGV...E KLSTVSPVFV CQSFAKNAGM
                tyrB  PFLDIAYQGF GAG.MEEDAY AIRAIA...S ..AGLP.ALV SNSFSKIFSL
               ZtyrB  PFLDIAYQGF GAG.MEEDAY AIRAIA...S ..AGLP.ALV SNSFSKIFSL
             NMB1678  PFMDIAYQGF GGD.LDSDAY AVRKAV...E ..MELP.LFV SNSFSKNLSL
             NMA1937  PFMDIAYQGF GGD.LDSDAY AVRKAV...E ..MELP.LFV SNSFSKNLSL
              PA3139  PFLDIAYQGF GNG.IEEDAA AVRLFA...Q ..SGLS.FFV SSSFSKSFSL
              XF0036  PCIDLAYQGF NQG.IDADAY AIRLLA...E ..EGISNYVV ANSYSKSFSL
                aspC  PLFDFAYQGF ARG.LEEDAE GLRAFA...A ..M.HKELIV ASSYSKNFGL
               ZaspC  PLFDFAYQGF ARG.LEEDAE GLRAFA...A ..M.HKELIV ASSYSKNFGL
              VC1293  PLFDFAYQGF ASG.VEEDAA GLRIFA...K ..Y.NSEILV ASSFSKNFGL
              HI1617  PLFDFAYQGL ANG.LDEDAY GLRAFA...A ..N.HKELLV ASSFSKNFGL
              PM0621  PLFDFAYQGF ANG.LEEDAF GLRTFA...K ..N.HKELLV ASSYSKNFGL
             NMB0540  PLFDFAYQGF GNG.LEEDAY GLRVFL...K ..H.NTELLI ASSYSKNFGM
             NMA0719  PLFDFAYQGF GNG.LEEDAY GLRVFL...K ..H.NTELLI ASSYSKNFGM
             VCA0513  PFVDIAYQGF GDG.LEQDAQ GLRYMA...E ..R.MEEMLI TTSCSKNFGL
             mll0405  PFVDIAYQGF GDG.LEADAL GLRLLA...A ..K.VPEMVV ASSCSKNFAV
              PA0870  PLIDFAYQGF GDG.LEEDAW AVRLFA...G ..E.LPEVLV TSSCSKNFGL
               CT637  PFFDMAYLGF ASG.IEEDRR PVRLCI...E ...AGVTTFV AGGASKIFSL
             CPn0740  PFFDTAYQGF AHG.IELDRK PIEIFI...S ...EGNTVLV AASSSKNFAL
             YKL106w  PIVDMAYQGL ESGNLLKDAY LLRLCLNVNK YPNWSNGIFL CQSFAKNMGL
```

```
           Consensus  Pf.D.AYQGf ..G.le.Da. ..Rl.a.... .........v a.S.sKnfg$

                      301                                                350
14:13:11|GENSCAN_pre  YGERAGAFTV LCSDE..... ....EE.... AARVMSQVKI LIRGLYSNPP
              YLR027c  YGERVGCFHL ALTKQ..... ....AQNKTI KPAVTSQLAK IIRSEVSNPP
                 tyrB  YGERVGGLSV MCEDA..... ....EA.... AGRVLGQLKA TVRRNYSSPP
                ZtyrB  YGERVGGLSV LCEDA..... ....EA.... AGRVLGQLKA TVRRNYSSPP
              NMB1678  YGERVGGLSV VCPNK..... ....EE.... ADLVFGQLKF TVRRIYSSPP
              NMA1937  YGERVGGLSV VCPNK..... ....EE.... ADLVFGQLKF TVRRIYSSPP
               PA3139  YGERVGALSI VTESR..... ....DE.... SARVLSQVKR VIRTNYSNPP
               XF0036  YGERVGGLSI VASNT..... ....EQ.... AQAIQSQVKR IIRTIYSSPS
                 aspC  YNERVGACTL VAADS..... ....ET.... VDRAFSQMKA AIRANYSNPP
                ZaspC  YNERVGACTL VAADS..... ....ET.... VDRAFSQMKA AIRANYSNPP
               VC1293  YNERVGAFTL VAPST..... ....TV.... AETAFSQVKA IIRSIYSNPP
               HI1617  YNERVGAFTL VAENA..... ....EI.... ASTSLTQVKS IIRTLYSNPA
               PM0621  YSERVGAFTL VAETE..... ....QI.... AATALTQVKT IIRTLYSNPA
              NMB0540  YNERVGAFTL VAEDE..... ....ET.... AARAHSQVKT IIRTLYSNPA
              NMA0719  YNERVGAFTL VAEDE..... ....AT.... AARAHSQVKT IIRTLYSNPA
              VCA0513  YRERTGAAIV IGKNQ..... ....QE.... VTNARGKMLT LARSTYTMPP
              mll0405  YRDRVGAAMV LARDS..... ....AQ.... ADVAMSQMLS AARAMYSMPP
               PA0870  YRDRVGALIV CAQNA..... ....EK.... LTDLRSQLAF LARNLWSTPP
                CT637  YGSRVGFFGA IHQDK..... ....LD.... LNRILSFLEE QIRGEYSSPA
              CPn0740  YGERVGYFAV HSTFT..... ....DE.... LVKIHSFLEE KIRGEYSSPQ
              YKL106w  YGERVGSLSV ITPATANNGK FNPLQQKNSL QQNIDSQLKK IVRGMYSSPP
           Consensus  Yg#RvGa..v .......... .......... .....sqlk. .iR..yS.Pp
```

http://www.ncbi.nlm.nih.gov/Structure/cdd/cdd.shtml

Conserved Domain

- recurring unit in molecular evolution, whose extents can be determined by sequence and structure analysis
- performs a particular function
- represented as a multiple local sequence alignment of proteins containing the domain

NCBI

Conserved Domain Database

Pfam SMART COG KOG PRK

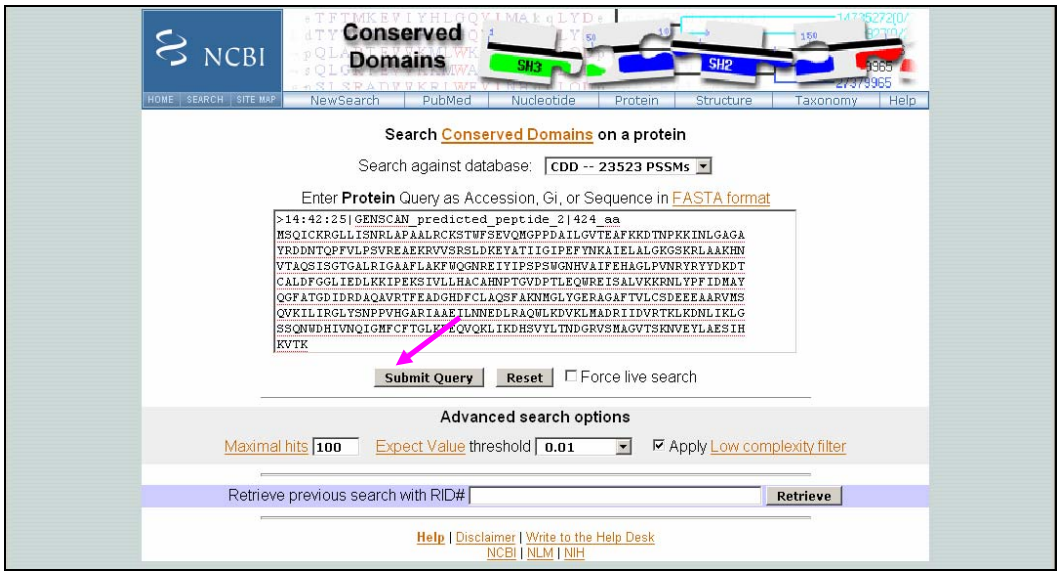
Curated CDs

- A position-specific scoring matrix (PSSM) is calculated
- CD-Search can be used to search against the PSSMs
- Manual curation of CDs has begun

NCBI

To search for protein domains and view a model structure for your protein, click here:

NCBI's Conserved Domain Search allows you to match your protein sequence to conserved protein domains in the Conserved Domain Database, generate a multiple sequence alignment based on this match, and explore 3D modeling templates for your sequence.
Paste your protein sequence from GenScan into the CD-Search query box and run the search. From the search results page, generate a multiple sequence alignment for the top 10 sequences representitive of the conserved domain hit by clicking on the cartoon of the domain. To view a structure with Cn3D, click on the "+Structure" link, use the listbox to specify "up to 5" sequences and invoke Cn3D with a display of a 3D modeling template, and a multiple sequence alignment including your query sequence, by pressing the "Show Structure" button. Residues identical in your sequence and the structural template are shown in red. Locate the Prosite Motif you found earlier within the Cn3D alignment window by using View--Find Pattern. Use Style--Annotate from the Cn3D window to color the highlighted residues and show their side chains.


NCBI
Conserved Domains
SH3
SH2
HOME SEARCH SITE MAP
NewSearch PubMed Nucleotide Protein Structure Taxonomy Help
Search Conserved Domains on a protein
Search against database: CDD -- 23523 PSSMs
Enter Protein Query as Accession, Gi, or Sequence in FASTA format
>14:42:25|GENSCAN_predicted_peptide_2|424_aa
MSQICKRGLLISNRLAPAALRCKSTWFSEVQMGPPDAILGVTEAFKKDTNPKKINLGAGA
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VTAQSISGTGALRIGAAFLAKFWQGNREIYIPSPSWGNHVAIFEHAGLPVNRYRYYDKDT
CALDFGGLIEDLKKIPEKSIVLLHACAHNPTGVDPTLEQWREISALVKKRNLYPFIDMAY
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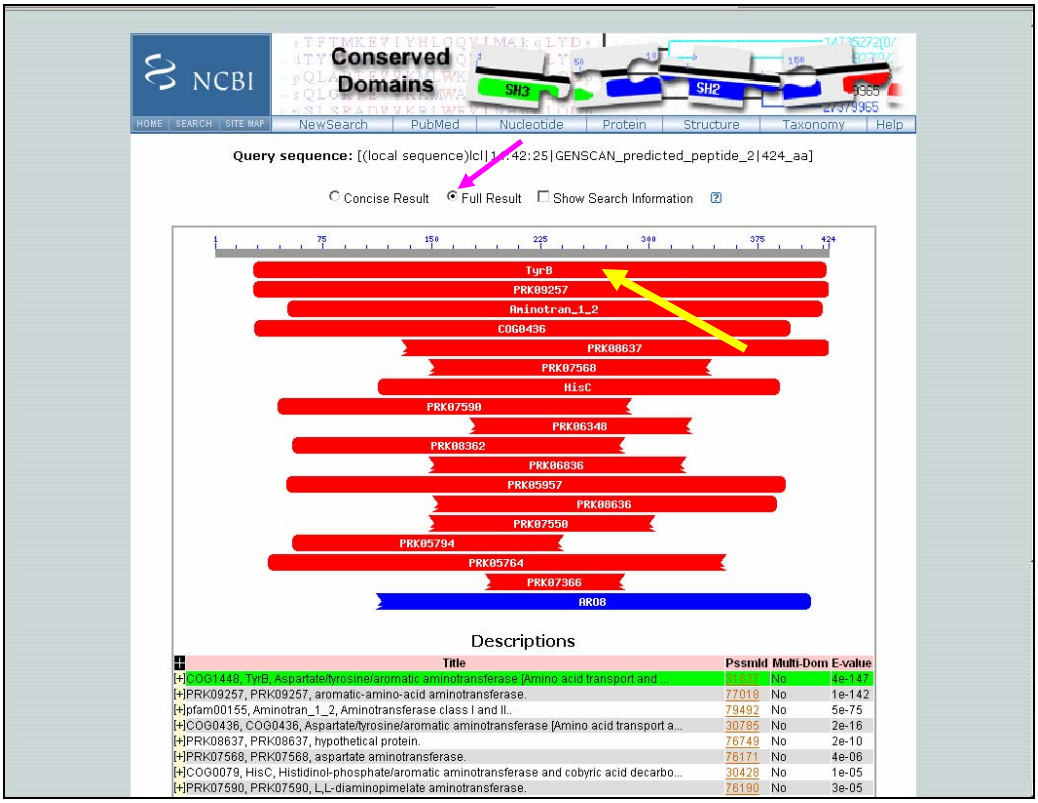
SSQNWDHIVNQIGMFCFTGLKPEQVQKLIKDHSVYLTNDGRVSMAGVTSKNVEYLAESIH
KVTK
Submit Query
Reset
Force live search
Advanced search options
Maximal hits 100
Expect Value threshold 0.01
Apply Low complexity filter
Retrieve previous search with RID#
Retrieve
Help | Disclaimer | Write to the Help Desk
NCBI | NLM | NIH


NCBI
Conserved Domains
SH3
SH2
HOME SEARCH SITE MAP
NewSearch PubMed Nucleotide Protein Structure Taxonomy Help
Query sequence: [(local sequence)lcl|14:42:25|GENSCAN_predicted_peptide_2|424_aa]
Concise Result
Full Result
Show Search Information
1 75 150 225 300 375 424
TyrB
PRK09257
Aminotran_1_2
COG0436
PRK08637
PRK07568
HisC
PRK07590
PRK06348
PRK08362
PRK06836
PRK05957
PRK08636
PRK07550
PRK05794
PRK05764
PRK07366
ARO8
Descriptions
Title | PssmId | Multi-Dom | E-value
[+]COG1448, TyrB, Aspartate/tyrosine/aromatic aminotransferase [Amino acid transport and ... | 91037 | No | 4e-147
[+]PRK09257, PRK09257, aromatic-amino-acid aminotransferase. | 77018 | No | 1e-142
[+]pfam00155, Aminotran_1_2, Aminotransferase class I and II.. | 79492 | No | 5e-75
[+]COG0436, COG0436, Aspartate/tyrosine/aromatic aminotransferase [Amino acid transport a... | 30785 | No | 2e-16
[+]PRK08637, PRK08637, hypothetical protein. | 76749 | No | 2e-10
[+]PRK07568, PRK07568, aspartate aminotransferase. | 76171 | No | 4e-06
[+]COG0079, HisC, Histidinol-phosphate/aromatic aminotransferase and cobyric acid decarbo... | 30428 | No | 1e-05
[+]PRK07590, PRK07590, L,L-diaminopimelate aminotransferase. | 76190 | No | 3e-05

NCBI

Conserved Domains

HOME | SEARCH | SITE MAP

Entrez | CDD | Structure | Protein | Help

COG1448: **TyrB, with user query added**

Aspartate/tyrosine/aromatic aminotransferase [Amino acid transport and metabolism]

Links

Statistics

Structure View

Other Related Conserved Domains

COG0075 COG0079 COG0156 COG0436 COG0520 COG0626 COG1104 COG2008 COG3977
pfam01041 pfam04864 PRK01533 PRK02610 PRK03262 PRK03317 PRK03321 PRK03967 PRK04152
PRK04635 PRK04781 PRK04870 PRK05387 PRK05664 PRK05764 PRK05794 PRK05839 PRK05942
PRK05957 PRK06056 PRK06107 PRK06108 PRK06207 PRK06220 PRK06225 PRK06290 PRK06348
PRK06375 PRK06425 PRK06507 PRK06575 PRK06836 PRK06855 PRK06959 PRK07212 PRK07309
PRK07310 PRK07324 PRK07337 PRK07366 PRK07367 PRK07392 PRK07543 PRK07550 PRK07568
PRK07590 PRK07681 PRK07682 PRK07683 PRK07777 PRK07778 PRK07865 PRK08056 PRK08068
PRK08069 PRK08153 PRK08354 PRK08361 PRK08362 PRK08443 PRK08636 PRK08637 PRK08912
PRK08960 PRK09105 PRK09147 PRK09148 PRK09257 PRK09265 PRK09276 PRK09440 PRK12414
pfam00155

Sequence Alignment

Reformat | Format: Compact Hypertext | Row Display: up to 10 | Color Bits: 2.0 bits | Type Selection: the most similar members

```
3TAT_A        1 .[1].F     QKVDAYAGDPILTLMERFKEDPRSDKVNLSIGLYYNEDGIIPQLQAVAEAEARLNAQP.[1].GASLYL 67
query        26 .[1].F     SEVQMGPPDAILGVTEAFKKDTNPKKINLGAGAYRDDNTQPFVLPSVREAEKRVVSRS     LDKEYA 91
1ARS          1 .[1].F     ENITAAPADPILGLADLFRADERPGKINLGIGVYKDETGKTPVLTSVKKAEQYLLENE     TTKNYL 66
1ART          1 .[1].F     ENITAAPADPILGLADLFRADERPGKINLGIGVYKDETGKTPVLTSVKKAEQYLLENE     TTKNYL 66
1QIS_A        1 .[1].F     ENITAAPADPILGLADLFRADERPGKINLGIGVYKDETGKTPVLTSVKKAEQYLLENE     TTKNYL 66
gi 1168262    1 .[1].F     EHIKAAPADPILGLGEAFKSETRENKINLGIGVYKDAQGTTPIMHAVKEAEKRLFDKE     KTKNYL 66
gi 15793696   2 .[1].F     KHIEAAPADPILGLGEAFKAETRPEKVNLGIGVYKDASGATPIVKAVKEAEKRLLESE     TTKNYL 67
gi 15676446   2 .[1].F     KHIEAAPADPILGLGEAFKAETRPEKVNLGIGVYKDASGATPLVKAVKEAEKRLLESE     TTKNYL 67
gi 17545729   3 .[1].F     SAVELAPRDPILGLNEAFNADARSTKVNLGVGVYFTDEGKIPVLRAVQEAEKARLAMA     APRGYL 68
gi 19112273  36 .[1].F.[3].ADVPMGPPDPIFGITEAYKKDGDVKKMNLGAGTYRDDAGKPYVLPSVRQAETELLSQK     LDKEYA 104

3TAT_A      68 PMEGLNCYRHAIAPLLFG.[1].DHPVLKQQRVATIQTLGGSGALKVGADFLKRY     FPESGVWVSDPTWENHVAIF 138
query       92 TIIGIPEFYNKAIELALG.[1].GSKRLAAKHNVTAQSISGTGALRIGAAFLAKF.[1].QGNREIYIPSPSWGNHVAIF 163
1ARS        67 GIDGIPEFGRCTQELLFG.[1].GSALINDKRARTAQTPGGTGALRVAADFLAKN     TSVKRVWVSNPSWPNHKSVF 137
1ART        67 GIDGIPEFGRCTQELLFG.[1].GSALINDKRARTAQTPGGTGALRVAADFLAKN     TSVKRVWVSNPSWPNHKSVF 137
1QIS_A      67 GIDGIPEFGRCTQELLFG.[1].GSALINDKRARTAQTPGGTGALRVAADFLAKN     TSVKRVWVSNPSWPNHKSVF 137
gi 1168262  67 TIDGIADYNEQTKALLFG.[1].DSEVIQSNRARTVQSLGGTGALRIAAEFIKRQ     TKAQNVWISTPTWPNHNAIF 137
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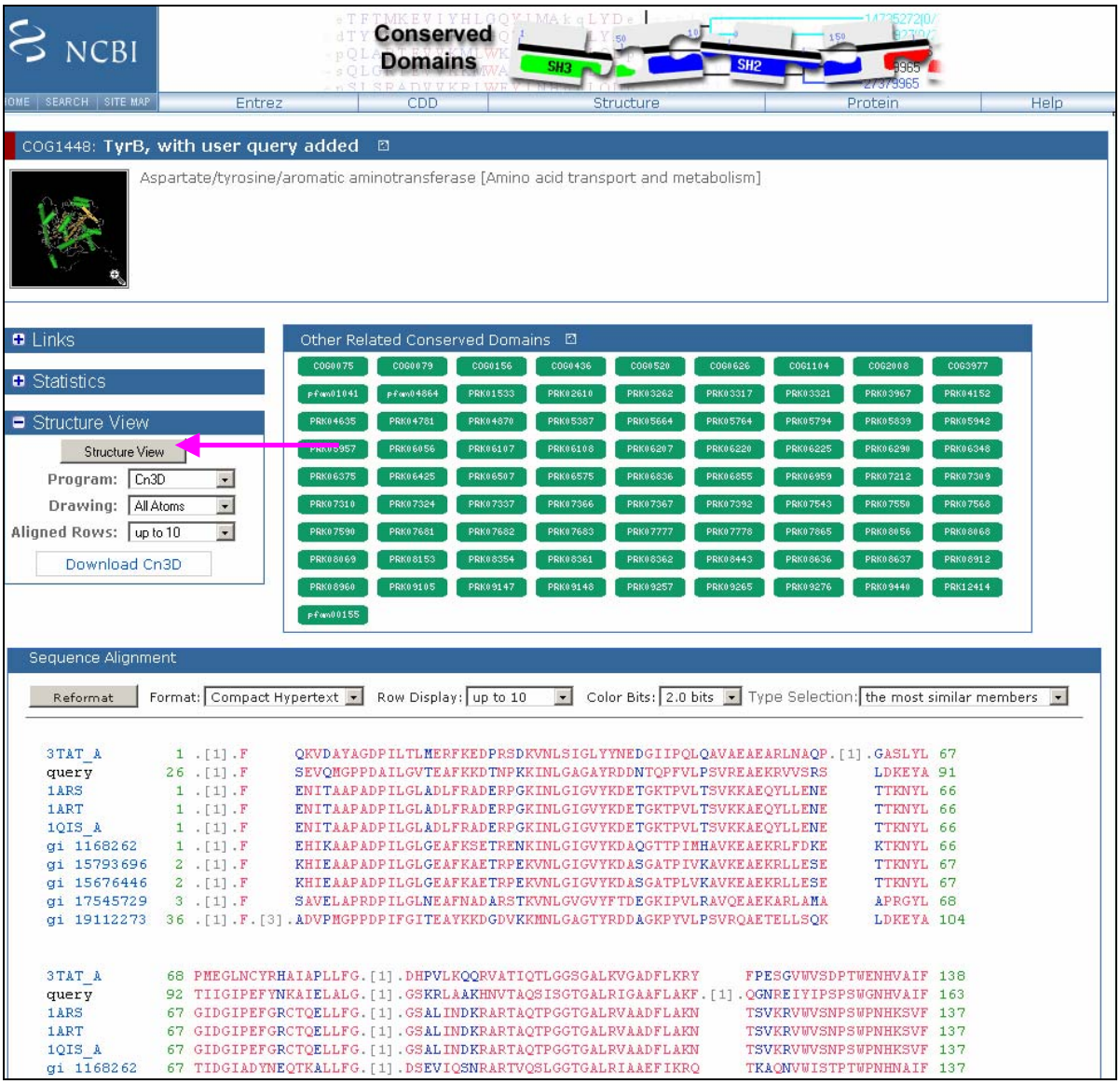
NCBI
Conserved Domains
SH3
SH2
Entrez
CDD
Structure
Protein
Help
COG1448: TyrB, with user query added
Aspartate/tyrosine/aromatic aminotransferase [Amino acid transport and metabolism]
Links
Statistics
Structure View
Structure View
Program: Cn3D
Drawing: All Atoms
Aligned Rows: up to 10
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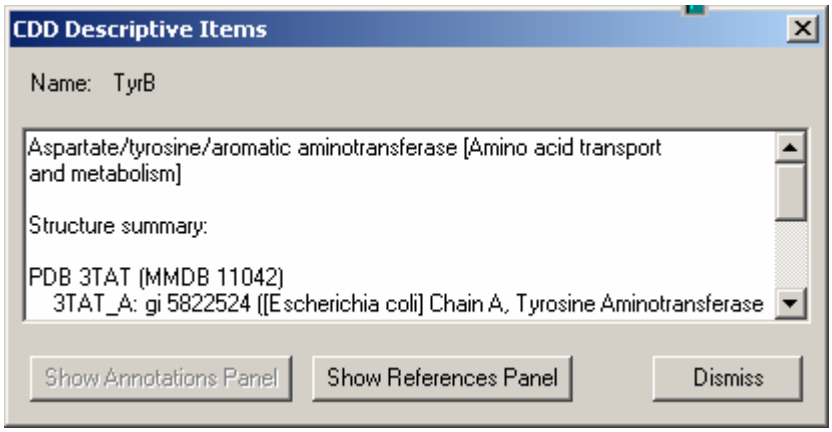
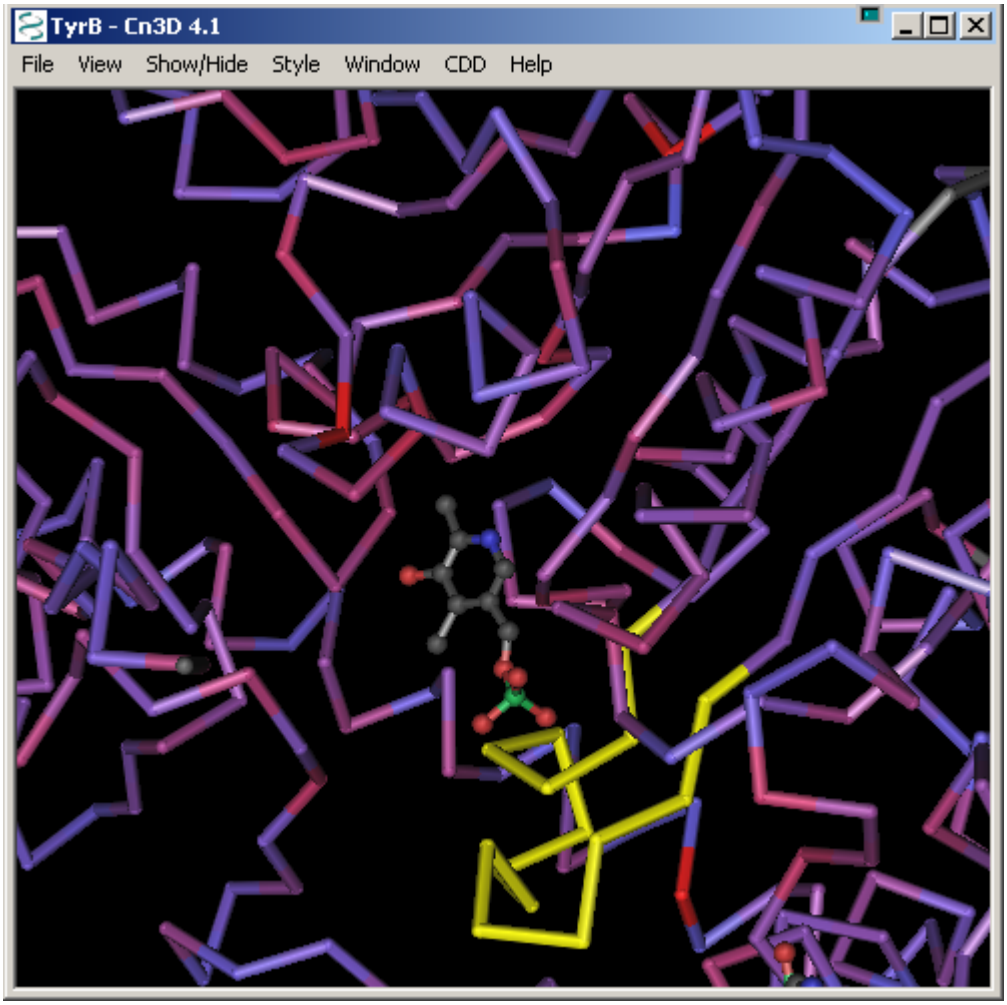
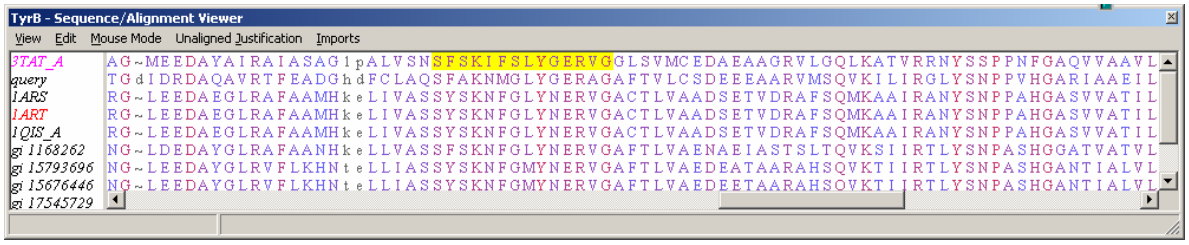
Sequence Alignment
Reformat
Format: Compact Hypertext
Row Display: up to 10
Color Bits: 2.0 bits
Type Selection: the most similar members


CDD Descriptive Items
Name: TyrB
Aspartate/tyrosine/aromatic aminotransferase [Amino acid transport and metabolism]
Structure summary:
PDB 3TAT (MMDB 11042)
3TAT_A: gi 5822524 ([Escherichia coli] Chain A, Tyrosine Aminotransferase
Show Annotations Panel
Show References Panel
Dismiss


TyrB - Cn3D 4.1
File View Show/Hide Style Window CDD Help


TyrB - Sequence/Alignment Viewer
View Edit Mouse Mode Unaligned Justification Imports
3TAT_A AG~MEEDAYAIRAIASAG1pALVSNSFSKIFSLYGERVGGLSVMCEDAEAAGRVLGQLKATVRRNYSSPPNFGAQVVAAVL
query TGdIDRDAQAVRTFEADGhdFCLAQSFAKNMGLYGERAGAFTVLCSDEEEAARVMSQVKILIRGLYSNPPVHGARIAAEIL
1ARS RG~LEEDAEGLRAFAAMHkeLIVASSYSKNFGLYNERVGACTLVAADSETVDRAFSQMKAAIRANYSNPPAHGASVVATIL
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1QIS_A RG~LEEDAEGLRAFAAMHkeLIVASSYSKNFGLYNERVGACTLVAADSETVDRAFSQMKAAIRANYSNPPAHGASVVATIL
gi 1168262 NG~LDEDAYGLRAFAANHkeLLVASSFSKNFGLYNERVGAFTLVAENAEIASTSLTQVKSIIRTLYSNPASHGGATVATVL
gi 15793696 NG~LEEDAYGLRVFLKHNteLLIASSYSKNFGMYNERVGAFTLVAEDEATAARAHSQVKTIIRTLYSNPASHGANTIALVL
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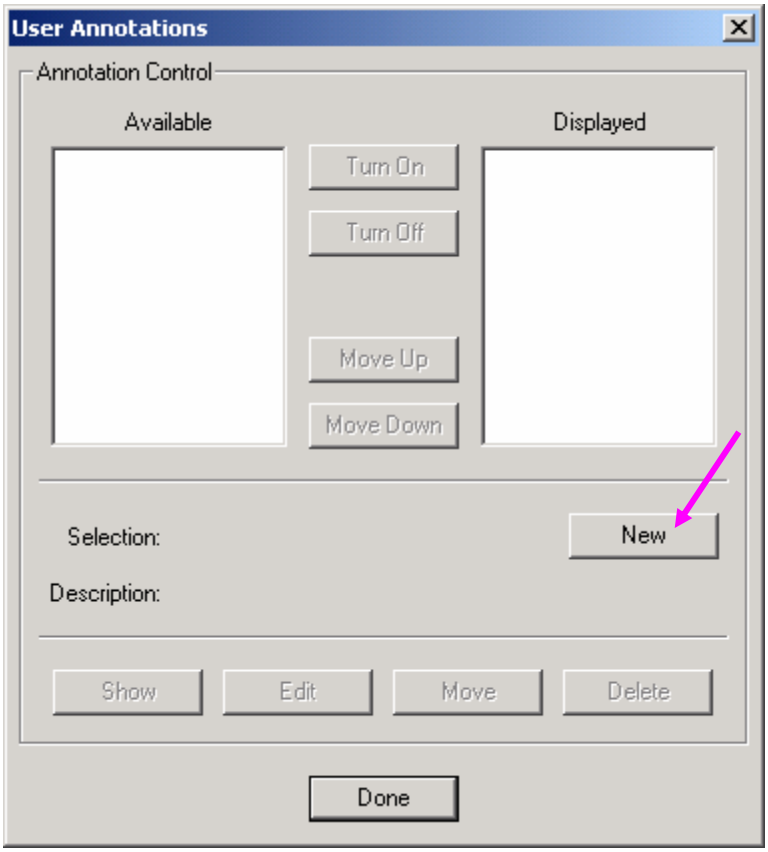
gi 17545729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Description:
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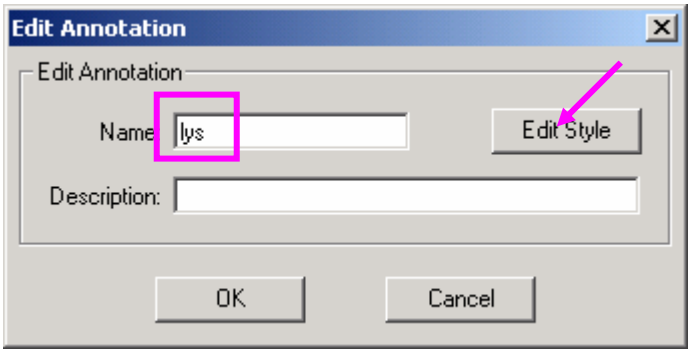
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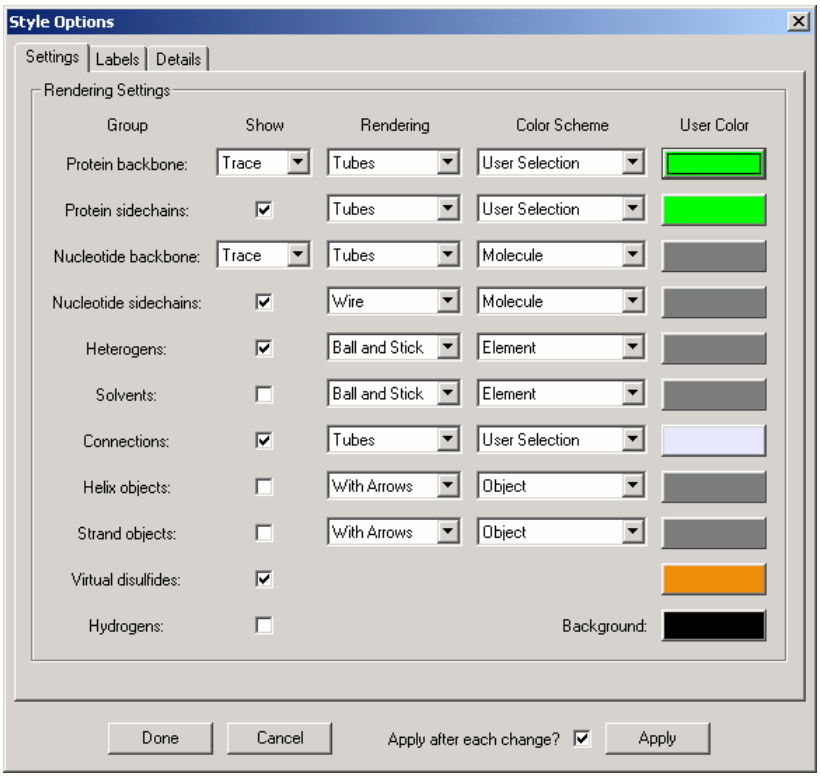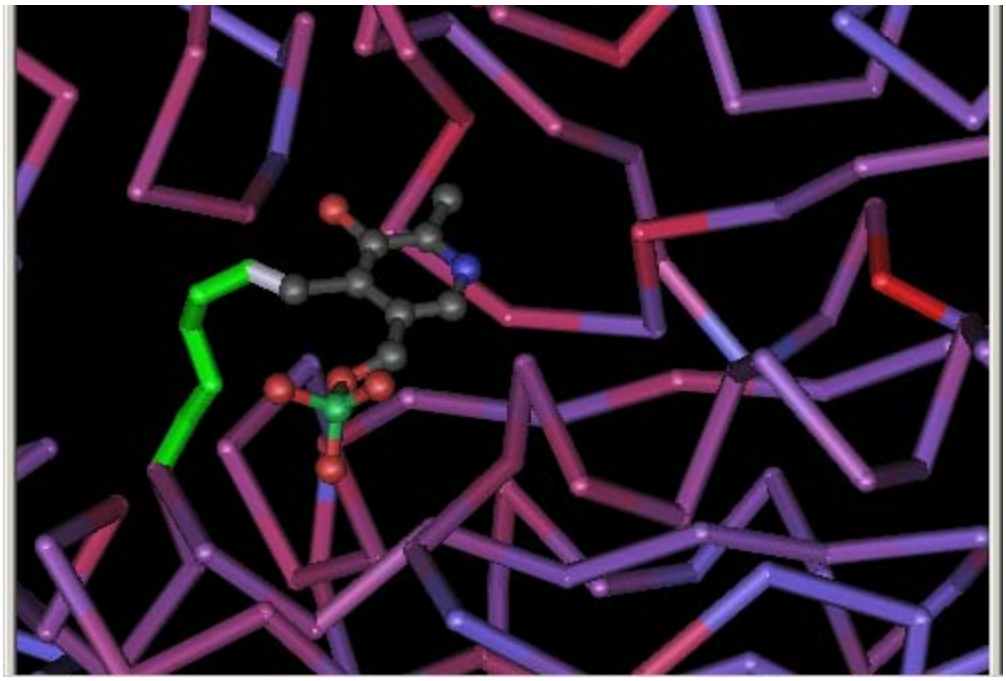
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Nucleotide backbone:
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Nucleotide sidechains:
Wire
Molecule
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Ball and Stick
Element
Solvents:
Ball and Stick
Element
Connections:
Tubes
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With Arrows
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Strand objects:
With Arrows
Object
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Hydrogens:
Background:
Done
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Apply