

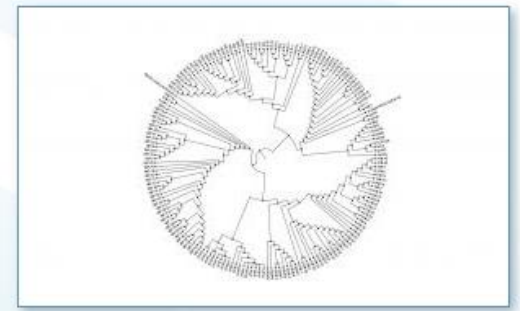
User Guide

[Les équipes de recherche](#)[Les plateformes](#)[Thématiques clés & découvertes](#)[Base de données](#)[16S Yourself](#)[MST Methanobrevibacter smithii](#)[URMS Database](#)[ARG-ANNOT](#)[SVARAP and aSVARAP](#)[List of Prokaryotes according to their Aerotolerant or Obligate Anaerobic Metabolism](#)**[Beta-lactamase Database](#)**[Données pour articles](#)[Sciences Humaines & Sociales](#)

MICROBIOLOGIE & SCIENCES HUMAINES

Beta-lactamase Database

The current database is the first large-scale effort to unify sequence, structure, function and phylogenetic tree of β -lactamase enzymes. This database provides a centralized collection of information based on antibiotic resistance genes. Currently, the database hosts the sequences from four Ambler molecular class A-D. Due to tremendous diversity and rapid identification of novel enzymes, this database will update continuously.

[➔ database online](#)

Click here for
Home page

This database is available at: <http://www.mediterranee-infection.com/article.php?laref=511&titre=beta-lactamase-database>

Home Page

This is home page of the database

Here user can fish out the available information of Beta-lactamase (Bla)

Welcome to the β -lactamases Database

Search for a β -lactamase by name



Find β -lactamase

Browse by class

Metallo- β -lactamases

See the class B β -lactamases

Serine- β -lactamases

See the class A β -lactamases

See the class C β -lactamases

See the class D β -lactamases

Explore the phylogenetic trees

Metallo- β -lactamases

See the the trees for class B β -lactamases

Serine- β -lactamases

See the trees for class A β -lactamases

See the trees for class C β -lactamases

See the trees for class D β -lactamases

References

In this search box, user can type the name of enzyme. For instance TEM-1.

And

Click on Green Button



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[See the class A \$\beta\$ -lactamases](#)

[See the class C \$\beta\$ -lactamases](#)

[See the class D \$\beta\$ -lactamases](#)

Explore the phylogenetic trees

Metallo- β -lactamases

[See the the trees for class B \$\beta\$ -lactamases](#)

Serine- β -lactamases

[See the trees for class A \$\beta\$ -lactamases](#)

[See the trees for class C \$\beta\$ -lactamases](#)

[See the trees for class D \$\beta\$ -lactamases](#)

[References](#)

In result page (at the top), these links provide sequence, structure, and functional downloadable information

- [Get the csv](#) of all these β -lactamases, their sequence and their accession number
- See the [structural information](#) for these β -lactamases
- See the [kinetic information](#) for these β -lactamases
- See the [MIC data](#) (Minimum inhibitory concentration) for these β -lactamases

User can download data from above link

Now user can find the primary information about the selected enzyme

Kinetic and MIC


Structure

Sequences

Results for "TEM-1"

Number of proteins: 1

- [Get the csv](#) of all these β -lactamases, their sequence and their accession number
- See the [structural information](#) for these β -lactamases
- See the [kinetic information](#) for these β -lactamases
- See the [MIC data](#) (Minimum inhibitory concentration) for these β -lactamases

| # | Protein Name  | Protein Description | Accession number | Localisation |
|---|--|-----------------------|--------------------------|--------------|
| 1 | TEM-1 | Betalactamase class A | JQ735917 | 1-861:861 |

Molecular class

Accession No.

Now, click on the respective link and follow the instruction / information

Welcome to the β -lactamases Database

Search for a β -lactamase by name



Find β -lactamase

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Serine- β -lactamases

See the trees for class A β -lactamases

See the trees for class C β -lactamases

See the trees for class D β -lactamases


References

This section provide the information of multiple enzymes. For example click on “see the class A β -lactamase”



Now user can select any targeted group of enzymes. For example TEM

Select a family of β -lactamase class A


| | | | |
|--------------|--------------|---|-------------|
| <i>ACI</i> | <i>AER</i> | <i>AST</i> | <i>BEL</i> |
| <i>BES</i> | <i>BIC</i> | <i>Bla</i> | <i>CARB</i> |
| <i>CEPA</i> | <i>Cfx</i> | <i>CKO</i> | <i>CME</i> |
| <i>CTX-M</i> | <i>ERP</i> | <i>FAR</i> | <i>FONA</i> |
| <i>GES</i> | <i>HERA</i> | <i>HugA</i> | <i>IBL</i> |
| <i>IMI</i> | <i>KPC</i> | <i>LEN</i> | <i>LUT</i> |
| <i>MAL</i> | <i>NMC</i> | <i>OKP</i> | <i>OXY</i> |
| <i>PER</i> | <i>PME</i> | <i>PSE</i> | <i>RAHN</i> |
| <i>ROB</i> | <i>SCO</i> | <i>SED</i> | <i>SFO</i> |
| <i>SHV</i> | <i>SME</i> |  <i>TEM</i> | <i>TLA</i> |
| <i>VEB</i> | <i>Bla-A</i> | | |

Results for "TEM%"

Number of proteins: 151

- [Get the csv](#) of all these β -lactamases, their sequence and their accession number
- See the [structural information](#) for these β -lactamases
- See the [kinetic information](#) for these β -lactamases
- See the [MIC data](#) (Minimum inhibitory concentration) for these β -lactamases



| # | Protein Name  | Protein Description | Accession number | Localisation |
|----|--|-----------------------|--------------------------|--------------|
| 1 | TEM-1 | Betalactamase class A | JQ735917 | 1-861:861 |
| 2 | TEM-10 | Betalactamase class A | U09188 | 198-1005:858 |
| 3 | TEM-101 | Betalactamase class A | AF495873 | 1-861:861 |
| 4 | TEM-102 | Betalactamase class A | AY029354 | 3-833:831 |
| 5 | TEM-104 | Betalactamase class A | AF516719 | 215-1075:861 |
| 6 | TEM-105 | Betalactamase class A | AF516720 | 215-1075:861 |
| 7 | TEM-106 | Betalactamase class A | AY101578 | 215-1075:861 |
| 8 | TEM-107 | Betalactamase class A | AY101764 | 207-1067:861 |
| 9 | TEM-108 | Betalactamase class A | AF506748 | 39-899:861 |
| 10 | TEM-109 | Betalactamase class A | AY628175 | 211-1071:861 |
| 11 | TEM-11 | Betalactamase class A | AY874537 | 178-1038:861 |
| 12 | TEM-110 | Betalactamase class A | AY130283 | 1-785:785 |




Here you can get information of multiple enzymes of TEM group

Results for "TEM%"

Number of results: 15251

- [Get the csv](#) of all the structural information about those β -lactamases

| # | Protein Name  | Subject id | Percent Identity | Alignment length | Mismatches | Gap opens | q.start | q.end | s.start | s.end | E-value | Bit-score |
|----|--|---|------------------|------------------|------------|-----------|---------|-------|---------|-------|---------|-----------|
| 1 | TEM-1D | gi 67464382 pdb 1ZG4 A | 99.3 | 286 | 2 | 0 | 1 | 286 | 1 | 286 | 0 | 588.0 |
| 2 | TEM-1D | gi 67464385 pdb 1ZG6 A | 98.95 | 286 | 3 | 0 | 1 | 286 | 1 | 286 | 0 | 587.0 |
| 3 | TEM-1D | gi 822599600 pdb 4ZJ1 A | 98.95 | 286 | 3 | 0 | 1 | 286 | 1 | 286 | 0 | 586.0 |
| 4 | TEM-1D | gi 822599601 pdb 4ZJ2 A | 98.6 | 286 | 4 | 0 | 1 | 286 | 1 | 286 | 0 | 585.0 |
| 5 | TEM-1D | gi 325533970 pdb 3P98 A | 98.6 | 286 | 4 | 0 | 1 | 286 | 1 | 286 | 0 | 583.0 |
| 6 | TEM-1D | gi 822599602 pdb 4ZJ3 A | 98.25 | 286 | 5 | 0 | 1 | 286 | 1 | 286 | 0 | 582.0 |
| 7 | TEM-1D | gi 8569630 pdb 1ERO A | 100 | 263 | 0 | 0 | 24 | 286 | 1 | 263 | 0 | 541.0 |
| 8 | TEM-1D | gi 7766856 pdb 1ESU A | 99.62 | 263 | 1 | 0 | 24 | 286 | 1 | 263 | 0 | 540.0 |
| 9 | TEM-1D | gi 15988093 pdb 1JTD A | 99.62 | 263 | 1 | 0 | 24 | 286 | 1 | 263 | 0 | 539.0 |
| 10 | TEM-1D | gi 21465759 pdb 1JWV A | 99.62 | 263 | 1 | 0 | 24 | 286 | 1 | 263 | 0 | 539.0 |
| 11 | TEM-1D | gi 6137619 pdb 1BT5 A | 99.24 | 263 | 2 | 0 | 24 | 286 | 1 | 263 | 0 | 539.0 |
| 12 | TEM-1D | gi 11514176 pdb 1FQG A | 99.62 | 263 | 1 | 0 | 24 | 286 | 1 | 263 | 0 | 539.0 |
| 13 | TEM-1D | gi 24158842 pdb 1LHY A | 99.62 | 263 | 1 | 0 | 24 | 286 | 1 | 263 | 0 | 539.0 |

This link provide structural information in external database (Protein Data Bank)

Structure Summary

3D View

Annotations

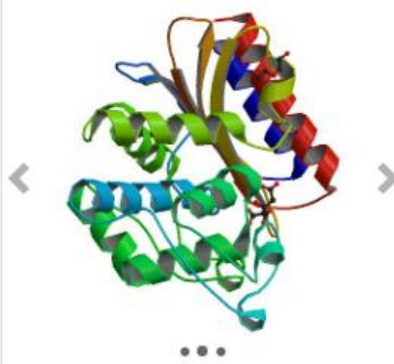
Sequence

Sequence Similarity

Structure Similarity

Experiment

Biological Assembly 1



View in 3D: JSmol or PV (in Browser)

Standalone Viewers

Simple Viewer Protein Workshop
Ligand Explorer Kiosk Viewer

Protein Symmetry: Asymmetric (View in 3D)

Protein Stoichiometry: Monomer

Biological assembly 1 assigned by authors and

3P98

The crystal structure of the extended spectrum beta-lactamase TEM-72 reveals inhibition by citrate

DOI: 10.2210/pdb3p98/pdb

Classification: [HYDROLASE](#)

Deposited: 2010-10-16 Released: 2011-03-09

Deposition author(s): [Docquier, J.D.](#), [Benvenuti, M.](#), [Calderone, V.](#), [Rossolini, G.M.](#), [Mangani, S.](#)

Organism: [Morganella morganii](#)

Expression System: Escherichia coli

Structural Biology Knowledgebase: 3P98 (2 models >12 annotations) [SABK.org](#)

Display Files

Download Files

Experimental Data Snapshot

Method: X-RAY DIFFRACTION

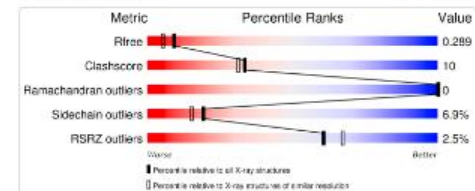
Resolution: 2.1 Å

R-Value Free: 0.283

R-Value Work: 0.201

wwPDB Validation

Full Report



Literature

Download Primary Citation

Structure of the extended-spectrum [beta]-lactamase TEM-72 inhibited by citrate

Functional Information

MIC data for "TEM%"

Number of results: 402

- [Get the csv](#) of all the physiological data linked to those β -lactamases

| # | Protein Name | Antibiotics | Without Bla MIC ($\mu\text{g/ml}$) | with Bla MIC ($\mu\text{g/ml}$) | Fold |
|----|--------------|-------------|--------------------------------------|-----------------------------------|---------|
| 1 | TEM-116 | Ceftazidime | 0.125 | 64 | 512 |
| 2 | TEM-116 | Cefotaxime | 0.0625 | 32 | 512 |
| 3 | TEM-116 | Aztreonam | 0.0625 | 32 | 512 |
| 4 | TEM-116 | Cefoxitin | 2 | 2 | 1 |
| 5 | TEM-116 | Cefepime | 0.0625 | 1 | 16 |
| 6 | TEM-116 | Ampicillin | 4 | 256 | 64 |
| 7 | TEM-116 | Cephalothin | 4 | 256 | 64 |
| 8 | TEM-116 | Imipenem | 0.0625 | 0.125 | 2 |
| 9 | TEM-121 | Ceftriaxone | 0.06 | 0.06 | 1 |
| 10 | TEM-121 | Cefuroxime | 0.5 | 8 | 16 |
| 11 | TEM-121 | Cephalothin | 4 | 16 | 4 |
| 12 | TEM-121 | Cefepime | 0.06 | 4 | 66.6667 |
| 13 | TEM-121 | Imipenem | 0.06 | 0.06 | 1 |

Kinetic data for "%"

Number of results: 1298

- [Get the csv](#) of all those kinetic data

| # | Protein Name | Antibiotic | k_{cat} (s^{-1}) | Km (μM) | k_{cat}/K_M |
|----|--------------|------------------|------------------------|----------------|---------------|
| 1 | ACC-1 | Nitrocefine | | 28±3.7 | |
| 2 | ACC-1 | Ceftazidime | | 17 | |
| 3 | ACC-1 | Cephaloridine | | 122±16 | |
| 4 | ACC-1 | Piperacillin | | 1.4±0.6 | |
| 5 | ACC-2 | Amoxicillin | 0.2 | <1 | >0.0002 |
| 6 | ACC-2 | Cefotaxime | 0.02 | 19 | 0 |
| 7 | ACC-2 | Cefepime | 3.6 | 147 | 0.02 |
| 8 | ACC-2 | Cefpirome | 1.2 | 5.2 | 0.24 |
| 9 | ACC-2 | Piperacillin | 7.7 | 14 | 0.55 |
| 10 | ACC-2 | Imipenem | <0.01 | | |
| 11 | ACC-2 | Cefoxitin | <0.01 | | |
| 12 | ACC-2 | Benzylpenicillin | 8.1 | 10 | 0.81 |
| 13 | ACC-2 | Aztreonam | <0.05 | | |
| 14 | ACC-2 | Cephalothin | 300 | 13 | 23.1 |
| 15 | ACC-2 | Ticarcillin | <0.05 | | |
| 16 | ACC-4 | Ceftazidime | 1.5±0.1 | 15±1.9 | 0.1 |

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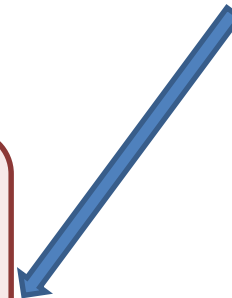
See the trees for class A β -lactamases

See the trees for class C β -lactamases

See the trees for class D β -lactamases

References

This section provide Phylogenetic information



Phylogenetic Tree for β -lactamases class A

Legend:

Each column in the heatmap, next to the tree, represent an antibiotic.

A **green** case stand for "Sensitive to the antibiotic"

A **yellow** case stand for "Uncertain resistance to the antibiotic"

A **red** case stand for "Resistant to the antibiotic"

A **black** case represent an absence of data

Those trees (except the circular one) were made using iTOL (Interactive Tree Of Life), an online tool for the display, annotation and management of phylogenetic trees.

You can download each tree in the format of your choice.

If you want to display the heatmap, you have to download the dataset file and log in to iTOL.

Then, once the tree is open in iTOL, simply click and drag the dataset file on the tree. For more information, visit the [help section](#).

Citations: Letunic and Bork (2006) *Bioinformatics* 23(1):127-8 and Letunic and Bork (2011) *Nucleic Acids Res* doi: 10.1093/nar/gkr201

[Download](#) the tree in Newick format

[Download](#) the tree in Nexus format

[Download](#) the tree in phyloXML format

[Download](#) the dataset file for the tree

Click on any thumbnail to see an enlarged view.

Circular Tree



How to search References ?

Welcome to the β -lactamases Database

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See the trees for class C β -lactamases

See the trees for class D β -lactamases

References

References

User can select any group of targeted enzymes

For example TEM

Select a family of β -lactamase

| | | | |
|-------------|--------------|-------------|-------------|
| <i>ACC</i> | <i>ACI</i> | <i>ACT</i> | <i>AER</i> |
| <i>AIM</i> | <i>AmpC</i> | <i>AST</i> | <i>B</i> |
| <i>BEL</i> | <i>BES</i> | <i>BIC</i> | <i>BIL</i> |
| <i>Bla</i> | <i>CARB</i> | <i>CEPA</i> | <i>CEPH</i> |
| <i>CFE</i> | <i>CFI</i> | <i>Cfx</i> | <i>CGB</i> |
| <i>CKO</i> | <i>CME</i> | <i>CMG</i> | <i>CMY</i> |
| <i>CphA</i> | <i>CTX-M</i> | <i>DHA</i> | <i>DIM</i> |
| <i>EBR</i> | <i>ERP</i> | <i>FAR</i> | <i>FONA</i> |
| <i>FOX</i> | <i>GES</i> | <i>GIM</i> | <i>GOB</i> |
| <i>HERA</i> | <i>HugA</i> | <i>IBL</i> | <i>IMI</i> |
| <i>IMIH</i> | <i>IMIS</i> | <i>IMP</i> | <i>IND</i> |
| <i>JOHN</i> | <i>KHM</i> | <i>KPC</i> | <i>L</i> |
| <i>LAT</i> | <i>LCR</i> | <i>LEN</i> | <i>LUT</i> |
| <i>MAL</i> | <i>MIR</i> | <i>MOR</i> | <i>MOX</i> |
| <i>MUS</i> | <i>NDM</i> | <i>NMC</i> | <i>NPS</i> |
| <i>OCH</i> | <i>OKP</i> | <i>OXA</i> | <i>OXY</i> |
| <i>PER</i> | <i>PME</i> | <i>PSE</i> | <i>RAHN</i> |
| <i>ROB</i> | <i>SCO</i> | <i>SED</i> | <i>SFO</i> |

Reference for β -lactamases:

Number of results: 98

Clicking on a PubMed id will send you to the PubMed page of the article from which the data were extracted

| # | Protein Name | Pubmed ID |
|----|--------------|-----------|
| 1 | TEM-10 | 358200 |
| 2 | TEM-102 | 12878521 |
| 3 | TEM-109 | 16251281 |
| 4 | TEM-11 | 15857942 |
| 5 | TEM-112 | 15282240 |
| 6 | TEM-113 | 15282240 |
| 7 | TEM-114 | 15282240 |
| 8 | TEM-115 | 15047521 |
| 9 | TEM-116 | 15243036 |
| 10 | TEM-118 | 12354869 |
| 11 | TEM-12 | 1329636 |
| 12 | TEM-120 | 15047521 |
| 13 | TEM-121 | 15561821 |

Click here



Now user can find the original article in external database, NCBI

www.ncbi.nlm.nih.gov/pubmed/?term=358200

NCBI Resources How To

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National Institutes of Health

PubMed 358200[uid]
Create RSS Create alert Advanced

Format: Abstract Send to

Proc Natl Acad Sci U S A. 1978 Aug;75(8):3737-41.

Nucleotide sequence of the ampicillin resistance gene of Escherichia coli plasmid pBR322.

Sutcliffe JG.

Abstract
I have determined the nucleotide sequence of the ampicillin resistance gene of pBR322, an Escherichia coli plasmid that encodes a penicillin beta-lactamase. This gene codes for a protein of 286 amino acid residues. The first 23 amino acids presumably form a signal for secretion, because they do not appear in the mature enzyme, whose partial amino acid sequence has been determined independently.

PMID: [358200](#) PMCID: [PMC392861](#)

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