



# Full wwPDB X-ray Structure Validation Report ⓘ

Oct 23, 2024 – 10:26 AM EDT

PDB ID : 3VYO  
Title : Crystal structure of Mycobacterium tuberculosis L,D-transpeptidase LdtMt2 N140 truncation mutant (residue 140-408)  
Authors : Li, W.J.; Li, D.F.; Bi, L.J.; Wang, D.C.  
Deposited on : 2012-09-30  
Resolution : 1.80 Å (reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.20.1
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.003 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

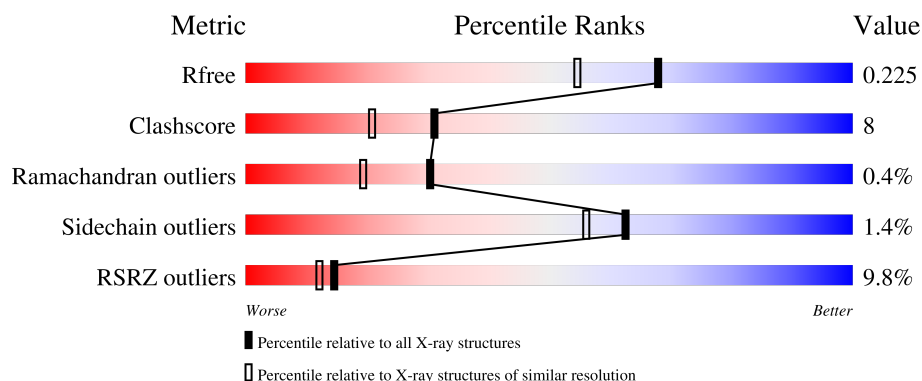
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.80 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	164625	7108 (1.80-1.80)
Clashscore	180529	8162 (1.80-1.80)
Ramachandran outliers	177936	8077 (1.80-1.80)
Sidechain outliers	177891	8076 (1.80-1.80)
RSRZ outliers	164620	7108 (1.80-1.80)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	269	<div> <div>9%</div> <div>83%</div> <div>14%</div> <div>• •</div> </div>
1	B	269	<div> <div>10%</div> <div>82%</div> <div>15%</div> <div>•</div> </div>

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4519 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Probable conserved lipoprotein LPPS.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	261	Total	C	N	O	S	Se	0	0	0
			2003	1262	347	387	1	6			
1	B	262	Total	C	N	O	S	Se	0	0	0
			2004	1262	346	389	1	6			

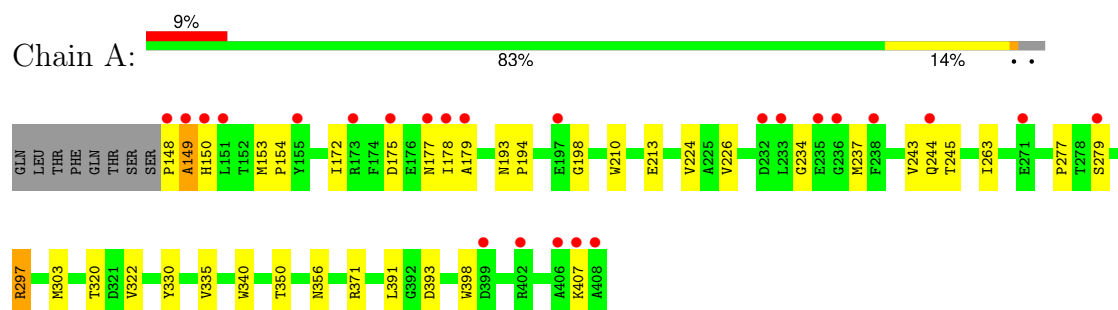
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	264	Total	O	0	0
			264	264		
2	B	248	Total	O	0	0
			248	248		

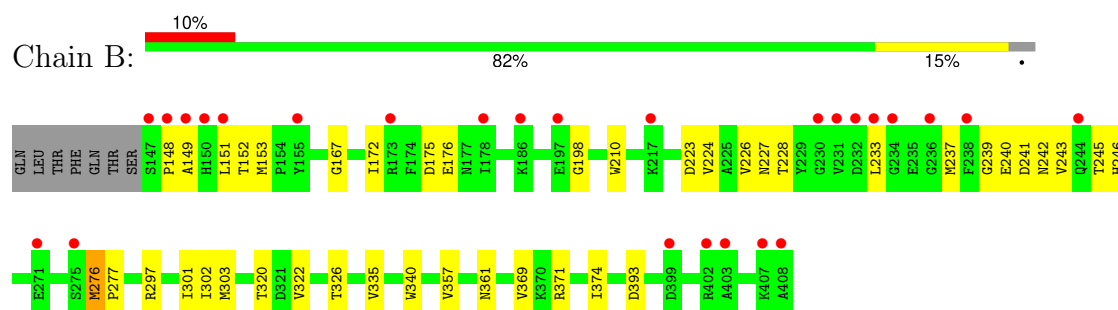
### 3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Probable conserved lipoprotein LPPS



- Molecule 1: Probable conserved lipoprotein LPPS



## 4 Data and refinement statistics

Property	Value	Source
Space group	I 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	116.37Å 121.19Å 122.99Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	42.27 – 1.80 42.27 – 1.80	Depositor EDS
% Data completeness (in resolution range)	99.9 (42.27-1.80) 99.9 (42.27-1.80)	Depositor EDS
$R_{merge}$	0.11	Depositor
$R_{sym}$	0.11	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.28 (at 1.79Å)	Xtriage
Refinement program	CNS 1.2	Depositor
R, $R_{free}$	0.209 , 0.225 0.209 , 0.225	Depositor DCC
$R_{free}$ test set	4046 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	19.8	Xtriage
Anisotropy	0.684	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 34.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.064 for -h,-l,-k	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	4519	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	27.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.30% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z  > 5$	RMSZ	$\# Z  > 5$
1	A	0.30	0/2054	0.61	1/2799 (0.0%)
1	B	0.30	0/2054	0.61	1/2800 (0.0%)
All	All	0.30	0/4108	0.61	2/5599 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	335	VAL	N-CA-C	-5.41	96.40	111.00
1	A	335	VAL	N-CA-C	-5.19	96.99	111.00

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2003	0	1898	29	0
1	B	2004	0	1897	36	0
2	A	264	0	0	4	3
2	B	248	0	0	7	0
All	All	4519	0	3795	63	3

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 8.

All (63) close contacts within the same asymmetric unit are listed below, sorted by their clash

magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:151:LEU:HB2	2:B:687:HOH:O	1.69	0.93
1:B:176:GLU:HG3	1:B:237:MSE:HE2	1.72	0.72
1:A:279:SER:HB2	2:A:523:HOH:O	1.89	0.70
1:A:224:VAL:HB	1:A:245:THR:HG22	1.77	0.67
1:A:213:GLU:HG3	1:A:398:TRP:CG	2.34	0.63
1:A:350:THR:HG23	2:A:523:HOH:O	1.98	0.62
1:A:148:PRO:O	1:A:149:ALA:HB3	2.01	0.61
1:B:152:THR:HB	1:B:237:MSE:HE3	1.81	0.60
1:A:150:HIS:H	1:A:150:HIS:CD2	2.18	0.60
1:B:176:GLU:HG3	1:B:237:MSE:CE	2.33	0.58
1:B:228:THR:O	1:B:239:GLY:HA3	2.03	0.58
1:B:277:PRO:HD2	2:B:502:HOH:O	2.03	0.58
1:A:226:VAL:HB	1:A:243:VAL:CG2	2.36	0.56
1:B:303:MSE:HE2	1:B:322:VAL:HG11	1.86	0.55
1:A:320:THR:HG23	1:B:340:TRP:HB2	1.88	0.55
1:B:226:VAL:HB	1:B:243:VAL:HG22	1.88	0.54
1:A:279:SER:OG	1:A:356:ASN:HB2	2.08	0.54
1:A:153:MSE:N	1:A:175:ASP:OD1	2.39	0.54
1:B:153:MSE:HE2	1:B:240:GLU:OE1	2.09	0.53
1:B:227:ASN:HA	1:B:242:ASN:OD1	2.09	0.53
1:A:179:ALA:HB3	1:A:234:GLY:HA3	1.92	0.52
1:A:198:GLY:HA3	1:A:210:TRP:CZ2	2.45	0.51
1:A:297:ARG:HH11	1:A:297:ARG:HG2	1.74	0.51
1:A:148:PRO:O	1:A:149:ALA:CB	2.59	0.51
1:B:198:GLY:HA3	1:B:210:TRP:CZ2	2.47	0.50
1:A:154:PRO:HG3	2:A:582:HOH:O	2.12	0.49
1:B:301:ILE:HG12	1:B:302:ILE:N	2.29	0.48
1:A:226:VAL:HB	1:A:243:VAL:HG23	1.95	0.48
1:B:276:MSE:HE2	2:B:690:HOH:O	2.13	0.48
1:B:151:LEU:O	1:B:237:MSE:HE1	2.15	0.47
1:A:263:ILE:HD13	1:A:277:PRO:HA	1.97	0.47
1:B:167:GLY:HA3	1:B:374:ILE:HD11	1.96	0.47
1:A:340:TRP:HB2	1:B:320:THR:HG23	1.96	0.46
1:B:226:VAL:HB	1:B:243:VAL:CG2	2.45	0.46
1:B:223:ASP:OD2	1:B:246:HIS:HD2	1.98	0.46
1:B:224:VAL:HB	1:B:245:THR:HG22	1.97	0.46
1:B:371:ARG:HG3	1:B:371:ARG:HH11	1.80	0.46
1:B:152:THR:CG2	1:B:233:LEU:HD12	2.47	0.45
1:B:148:PRO:N	2:B:687:HOH:O	2.50	0.45
1:B:176:GLU:CG	1:B:237:MSE:HE2	2.44	0.44
1:A:177:ASN:O	1:A:237:MSE:HE1	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:178:ILE:HD13	1:A:237:MSE:CE	2.49	0.43
1:A:178:ILE:HD13	1:A:237:MSE:HE1	2.00	0.43
1:B:175:ASP:OD1	1:B:176:GLU:HG2	2.18	0.43
1:B:369:VAL:HB	2:B:588:HOH:O	2.18	0.43
1:A:330:TYR:CE1	1:A:391:LEU:HG	2.54	0.42
1:A:371:ARG:HG3	1:A:371:ARG:HH11	1.84	0.42
1:B:198:GLY:HA3	1:B:210:TRP:CH2	2.54	0.42
1:B:151:LEU:HB3	1:B:240:GLU:HB2	2.01	0.42
1:B:357:VAL:HA	2:B:748:HOH:O	2.20	0.42
1:A:303:MSE:HE2	1:A:322:VAL:HG11	2.00	0.42
1:B:361:ASN:ND2	2:B:502:HOH:O	2.49	0.42
1:B:152:THR:HB	1:B:237:MSE:CE	2.49	0.42
1:B:240:GLU:O	1:B:241:ASP:HB2	2.20	0.42
1:B:276:MSE:HA	1:B:277:PRO:HD3	1.93	0.42
1:A:226:VAL:HB	1:A:243:VAL:HG22	2.01	0.41
1:A:237:MSE:HE2	2:A:578:HOH:O	2.20	0.41
1:B:152:THR:HG21	1:B:233:LEU:HD12	2.02	0.41
1:A:193:ASN:HA	1:A:194:PRO:C	2.40	0.41
1:B:172:ILE:HD12	1:B:172:ILE:N	2.36	0.40
1:B:297:ARG:HG2	1:B:326:THR:HG23	2.03	0.40
1:A:172:ILE:HD12	1:A:172:ILE:N	2.37	0.40
1:A:150:HIS:CD2	1:A:150:HIS:N	2.87	0.40

All (3) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:739:HOH:O	2:A:739:HOH:O[6_665]	1.84	0.36
2:A:756:HOH:O	2:A:756:HOH:O[8_566]	2.12	0.08
2:A:623:HOH:O	2:A:623:HOH:O[8_566]	2.13	0.07

## 5.3 Torsion angles ⓘ

### 5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was



analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	259/269 (96%)	247 (95%)	11 (4%)	1 (0%)	30	19
1	B	260/269 (97%)	248 (95%)	11 (4%)	1 (0%)	30	19
All	All	519/538 (96%)	495 (95%)	22 (4%)	2 (0%)	30	19

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	149	ALA
1	A	149	ALA

### 5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	213/215 (99%)	209 (98%)	4 (2%)	52	43
1	B	213/215 (99%)	211 (99%)	2 (1%)	75	72
All	All	426/430 (99%)	420 (99%)	6 (1%)	62	56

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	244	GLN
1	A	297	ARG
1	A	393	ASP
1	A	407	LYS
1	B	276	MSE
1	B	393	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	150	HIS

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Mol	Chain	Res	Type
1	A	227	ASN
1	A	244	GLN
1	B	227	ASN
1	B	244	GLN
1	B	246	HIS

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

### 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

### 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

There are no ligands in this entry.

### 5.7 Other polymers [i](#)

There are no such residues in this entry.

### 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	255/269 (94%)	0.38	24 (9%) 15 13	14, 21, 44, 66	0
1	B	256/269 (95%)	0.43	26 (10%) 13 11	14, 21, 46, 69	0
All	All	511/538 (94%)	0.41	50 (9%) 14 12	14, 21, 45, 69	0

All (50) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	148	PRO	6.9
1	A	408	ALA	6.8
1	A	148	PRO	6.6
1	B	147	SER	5.1
1	A	155	TYR	5.0
1	B	149	ALA	4.5
1	B	408	ALA	4.3
1	B	150	HIS	4.1
1	B	155	TYR	4.1
1	B	236	GLY	3.9
1	A	149	ALA	3.7
1	B	232	ASP	3.3
1	A	407	LYS	3.0
1	B	238	PHE	3.0
1	A	151	LEU	3.0
1	B	151	LEU	2.9
1	B	275	SER	2.8
1	A	406	ALA	2.8
1	A	197	GLU	2.8
1	B	230	GLY	2.7
1	B	399	ASP	2.7
1	A	399	ASP	2.7
1	B	402	ARG	2.6
1	B	271	GLU	2.6

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Mol	Chain	Res	Type	RSRZ
1	A	232	ASP	2.6
1	A	233	LEU	2.6
1	A	175	ASP	2.5
1	B	217	LYS	2.5
1	B	231	VAL	2.5
1	A	271	GLU	2.5
1	A	150	HIS	2.5
1	B	234	GLY	2.4
1	A	402	ARG	2.4
1	B	407	LYS	2.4
1	A	238	PHE	2.3
1	B	197	GLU	2.3
1	B	173	ARG	2.2
1	B	178	ILE	2.2
1	B	403	ALA	2.2
1	A	173	ARG	2.2
1	B	233	LEU	2.2
1	B	186	LYS	2.2
1	A	177	ASN	2.1
1	A	236	GLY	2.1
1	A	178	ILE	2.1
1	B	244	GLN	2.1
1	A	279	SER	2.1
1	A	235	GLU	2.0
1	A	244	GLN	2.0
1	A	179	ALA	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

There are no non-standard protein/DNA/RNA residues in this entry.

## 6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

## 6.4 Ligands ⓘ

There are no ligands in this entry.

## 6.5 Other polymers [i](#)

There are no such residues in this entry.