



Full wwPDB X-ray Structure Validation Report ⓘ

Jul 25, 2017 – 07:43 AM EDT

PDB ID : 5UXS
Title : X ray structure of the periplasmic ligand binding protein YfeA from Yersinia pestis
Authors : Radka, C.D.; DeLucas, L.J.; Aller, S.G.
Deposited on : unknown
Resolution : 1.42 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

A user guide is available at

<http://wwpdb.org/validation/2016/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

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

MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.9-1692
EDS	:	rb-20029824
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	rb-20029824

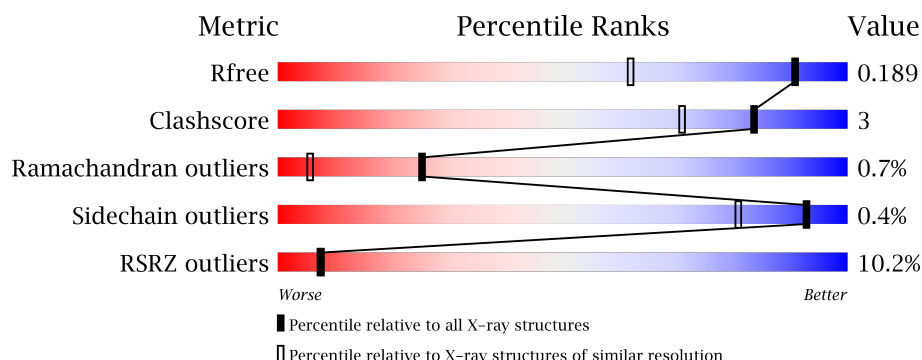
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.42 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}	100719	1836 (1.44-1.40)
Clashscore	112137	1955 (1.44-1.40)
Ramachandran outliers	110173	1908 (1.44-1.40)
Sidechain outliers	110143	1907 (1.44-1.40)
RSRZ outliers	101464	1845 (1.44-1.40)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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	323	<div> <div>9%</div> <div>79%</div> <div>6%</div> <div>15%</div> </div>

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 2519 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 Periplasmic chelated iron-binding protein YfeA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	274	Total	C	N	O	S	0	0	0
			2153	1381	364	405	3			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	312	LEU	-	expression tag	UNP Q56952
A	313	GLU	-	expression tag	UNP Q56952
A	314	HIS	-	expression tag	UNP Q56952
A	315	HIS	-	expression tag	UNP Q56952
A	316	HIS	-	expression tag	UNP Q56952
A	317	HIS	-	expression tag	UNP Q56952
A	318	HIS	-	expression tag	UNP Q56952
A	319	HIS	-	expression tag	UNP Q56952
A	320	HIS	-	expression tag	UNP Q56952
A	321	HIS	-	expression tag	UNP Q56952
A	322	HIS	-	expression tag	UNP Q56952
A	323	HIS	-	expression tag	UNP Q56952

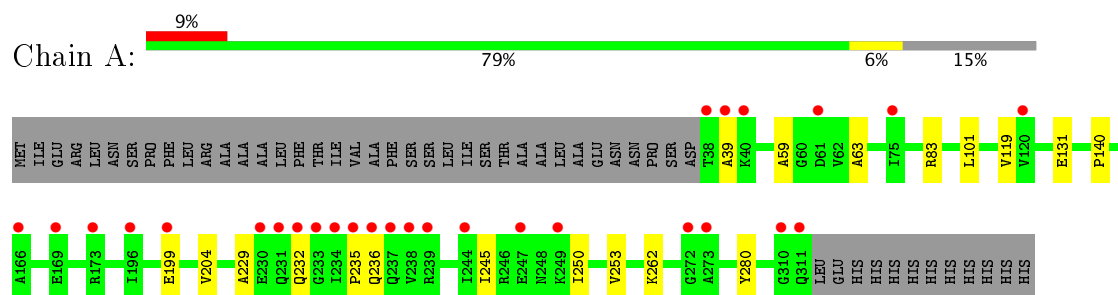
- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Zn	0	0
			1	1		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	365	Total	O	0	0
			365	365		

- Molecule 1: Periplasmic chelated iron-binding protein YfeA



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	41.74Å 52.12Å 113.07Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	33.58 – 1.42 33.58 – 1.42	Depositor EDS
% Data completeness (in resolution range)	99.4 (33.58-1.42) 97.5 (33.58-1.42)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.15 (at 1.42Å)	Xtriage
Refinement program	PHENIX (1.11.1 _2575: ???)	Depositor
R, R_{free}	0.179 , 0.190 0.178 , 0.189	Depositor DCC
R_{free} test set	1988 reflections (4.25%)	DCC
Wilson B-factor (Å ²)	16.3	Xtriage
Anisotropy	0.428	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 42.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	2519	wwPDB-VP
Average B, all atoms (Å ²)	21.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.42% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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](#)

Bond lengths and bond angles in the following residue types are not validated in this section: ZN

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	0.34	0/2205	0.51	0/3002

There are no bond length outliers.

There are no bond angle outliers.

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	2153	0	2154	12	0
2	A	1	0	0	0	0
3	A	365	0	0	6	1
All	All	2519	0	2154	12	1

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 3.

All (12) 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:A:262:LYS:NZ	3:A:504:HOH:O	2.19	0.73

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:280:TYR:OH	3:A:501:HOH:O	2.13	0.66
1:A:232:GLN:OE1	3:A:502:HOH:O	2.14	0.64
1:A:119:VAL:O	3:A:503:HOH:O	2.15	0.64
1:A:245:ILE:HD13	1:A:250:ILE:HB	1.84	0.58
1:A:59:ALA:HB1	1:A:63:ALA:HB3	1.88	0.56
1:A:83:ARG:NH1	3:A:512:HOH:O	2.30	0.53
1:A:204:VAL:HG12	1:A:253:VAL:HG23	1.96	0.47
1:A:199:GLU:N	1:A:199:GLU:OE2	2.45	0.45
1:A:119:VAL:HG12	3:A:688:HOH:O	2.16	0.45
1:A:235:PRO:O	1:A:236:GLN:HB3	2.17	0.43
1:A:101:LEU:HB2	1:A:140:PRO:HB2	2.03	0.40

All (1) 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)
3:A:725:HOH:O	3:A:742:HOH:O[1_545]	1.95	0.25

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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	272/323 (84%)	264 (97%)	6 (2%)	2 (1%)	25 6

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	39	ALA
1	A	229	ALA

5.3.2 Protein sidechains [i](#)

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	231/273 (85%)	230 (100%)	1 (0%)	93	81

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	131	GLU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

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, 95th 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 ²)	Q<0.9
1	A	274/323 (84%)	1.07	28 (10%) 7 7	11, 18, 38, 60	0

All (28) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	38	THR	14.9
1	A	233	GLY	13.2
1	A	234	ILE	10.8
1	A	39	ALA	10.0
1	A	235	PRO	7.0
1	A	272	GLY	5.3
1	A	247	GLU	4.8
1	A	61	ASP	4.6
1	A	230	GLU	4.5
1	A	239	ARG	4.4
1	A	244	ILE	4.4
1	A	199	GLU	3.9
1	A	40	LYS	3.5
1	A	237	GLN	3.3
1	A	231	GLN	3.2
1	A	311	GLN	3.2
1	A	232	GLN	3.2
1	A	173	ARG	3.0
1	A	310	GLY	2.9
1	A	166	ALA	2.7
1	A	236	GLN	2.6
1	A	238	VAL	2.6
1	A	273	ALA	2.4
1	A	169	GLU	2.3
1	A	249	LYS	2.2
1	A	120	VAL	2.2
1	A	196	ILE	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	75	ILE	2.1

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

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

6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors(Å ²)	Q<0.9
2	ZN	A	401	1/1	0.99	0.06	-6.56	15,15,15,15	0

6.5 Other polymers [i](#)

There are no such residues in this entry.