



Full wwPDB X-ray Structure Validation Report ⓘ

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PDB ID : 7A73 / pdb_00007a73
Title : Crystal structure of the two-domain cyclophilinA from Anabaena sp.
Authors : Yadav, S.; Schleiff, E.; Yildiz, O.
Deposited on : 2020-08-27
Resolution : 1.14 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

<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>.

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

MolProbity	:	4-5-2 with Phenix2.0
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

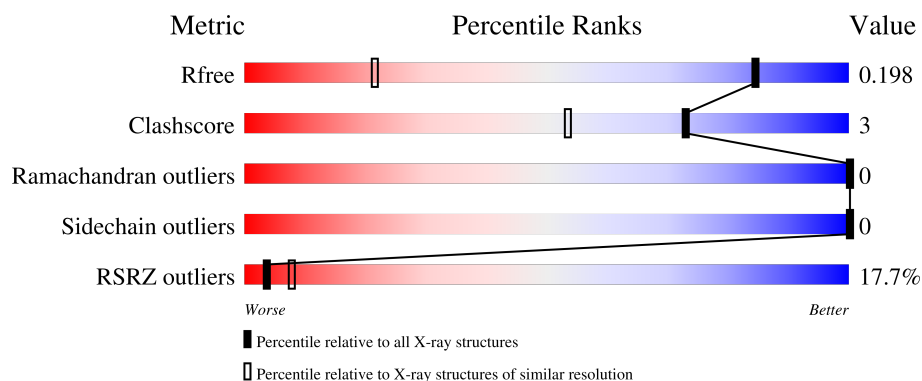
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.14 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}	180053	1380 (1.16-1.12)
Clashscore	190562	1393 (1.16-1.12)
Ramachandran outliers	187476	1369 (1.16-1.12)
Sidechain outliers	187428	1369 (1.16-1.12)
RSRZ outliers	180081	1379 (1.16-1.12)

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 ≥ 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	375	16% 82% 7% 11%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 3198 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 Alr5059 protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	334	Total	C	N	O	S	0	0	0
			2608	1657	440	508	3			

There are 7 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	369	ALA	-	expression tag	UNP Q8YM80
A	370	ILE	-	expression tag	UNP Q8YM80
A	371	GLU	-	expression tag	UNP Q8YM80
A	372	VAL	-	expression tag	UNP Q8YM80
A	373	LEU	-	expression tag	UNP Q8YM80
A	374	PHE	-	expression tag	UNP Q8YM80
A	375	GLN	-	expression tag	UNP Q8YM80

- Molecule 2 is CALCIUM ION (CCD ID: CA) (formula: Ca).

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

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	589	Total	O	0	0
			589	589		

4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	41.12Å 103.06Å 44.17Å 90.00° 114.74° 90.00°	Depositor
Resolution (Å)	37.38 – 1.14 37.38 – 1.14	Depositor EDS
% Data completeness (in resolution range)	94.7 (37.38-1.14) 94.2 (37.38-1.14)	Depositor EDS
R_{merge}	0.20	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.05 (at 1.03Å)	Xtriage
Refinement program	PHENIX 1.18.2_3874, PHENIX 1.18.2_3874	Depositor
R, R_{free}	0.179 , 0.198 0.179 , 0.198	Depositor DCC
R_{free} test set	5592 reflections (2.16%)	wwPDB-VP
Wilson B-factor (Å ²)	14.8	Xtriage
Anisotropy	0.068	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 45.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.023 for h,-k,-h-l	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	3198	wwPDB-VP
Average B, all atoms (Å ²)	29.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.84% 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: CA

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	0.33	0/2654	0.61	4/3595 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	161	GLU	CG-CD-OE2	-9.05	97.58	118.40
1	A	111	GLN	CA-C-N	-5.23	111.90	121.52
1	A	111	GLN	C-N-CA	-5.23	111.90	121.52
1	A	161	GLU	CG-CD-OE1	5.21	130.38	118.40

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	161	GLU	Sidechain

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	2608	0	2632	17	1
2	A	1	0	0	0	0
3	A	589	0	0	7	2
All	All	3198	0	2632	17	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 3.

All (17) 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:130:GLU:OE2	3:A:502:HOH:O	2.08	0.71
1:A:327:ARG:NH2	3:A:501:HOH:O	2.07	0.58
1:A:98:LYS:O	1:A:101:GLN:HG2	2.05	0.56
1:A:91:LYS:HE2	1:A:95:ILE:HD11	1.90	0.53
1:A:133:GLN:NE2	3:A:503:HOH:O	2.26	0.50
1:A:370:ILE:O	1:A:370:ILE:HG22	2.12	0.48
1:A:70:GLU:HA	1:A:144:ARG:HH21	1.80	0.47
1:A:334:LEU:HD22	1:A:341:LEU:HD22	1.98	0.45
1:A:313:GLU:OE2	1:A:316:LEU:HD12	2.16	0.45
1:A:107:PRO:HB2	1:A:109:GLU:OE1	2.16	0.45
1:A:315:GLU:HG2	1:A:316:LEU:HG	2.00	0.43
1:A:351:GLU:HG3	3:A:571:HOH:O	2.20	0.42
1:A:249:LYS:NZ	3:A:515:HOH:O	2.42	0.42
1:A:245:PRO:HG3	3:A:922:HOH:O	2.19	0.42
1:A:316:LEU:HA	1:A:316:LEU:HD23	1.81	0.41
1:A:187:ASN:HB3	3:A:571:HOH:O	2.20	0.41
1:A:124:GLY:O	1:A:128:VAL:HG23	2.21	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)
1:A:80:ARG:NH1	1:A:112:THR:OG1[1_656]	1.98	0.22
3:A:501:HOH:O	3:A:579:HOH:O[1_656]	2.00	0.20
3:A:664:HOH:O	3:A:898:HOH:O[2_747]	2.12	0.08

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	332/375 (88%)	326 (98%)	6 (2%)	0	100	100

There are no Ramachandran outliers to report.

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	283/317 (89%)	283 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	101	GLN
1	A	364	GLN
1	A	366	GLN

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](#)

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 [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, 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	334/375 (89%)	1.05	59 (17%) 4 8	10, 20, 62, 100	0

All (59) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	316	LEU	9.0
1	A	346	ALA	6.9
1	A	370	ILE	6.0
1	A	367	SER	5.9
1	A	318	PRO	5.6
1	A	112	THR	5.3
1	A	374	PHE	5.1
1	A	319	ALA	5.0
1	A	347	GLY	4.9
1	A	317	THR	4.5
1	A	320	GLY	4.4
1	A	238	LYS	4.2
1	A	43	ALA	4.1
1	A	368	ALA	4.0
1	A	160	LYS	4.0
1	A	314	PRO	3.8
1	A	369	ALA	3.8
1	A	231	GLN	3.6
1	A	372	VAL	3.5
1	A	321	ARG	3.4
1	A	142	LEU	3.2
1	A	161	GLU	3.2
1	A	226	GLU	3.2
1	A	373	LEU	3.1
1	A	78	ALA	3.1
1	A	315	GLU	3.1
1	A	109	GLU	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	286	SER	3.0
1	A	237	GLY	3.0
1	A	313	GLU	2.9
1	A	42	ASN	2.9
1	A	322	ASN	2.9
1	A	323	LEU	2.8
1	A	338	ARG	2.8
1	A	77	ARG	2.7
1	A	108	GLU	2.7
1	A	249	LYS	2.7
1	A	110	ARG	2.7
1	A	360	ASP	2.7
1	A	81	ARG	2.6
1	A	58	ASN	2.6
1	A	371	GLU	2.5
1	A	119	ASN	2.5
1	A	79	ASN	2.5
1	A	104	THR	2.4
1	A	327	ARG	2.4
1	A	225	GLU	2.4
1	A	298	THR	2.3
1	A	297	GLU	2.3
1	A	44	ILE	2.3
1	A	97	ASP	2.2
1	A	134	SER	2.2
1	A	236	PRO	2.1
1	A	82	TRP	2.1
1	A	357	GLN	2.1
1	A	91	LYS	2.0
1	A	365	PRO	2.0
1	A	366	GLN	2.0
1	A	76	LEU	2.0

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 oligosaccharides in this entry.

6.4 Ligands

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. 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	B-factors(Å ²)	Q<0.9
2	CA	A	400	1/1	0.99	0.08	23,23,23,23	1

6.5 Other polymers

There are no such residues in this entry.