



wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 1, 2016 – 08:55 AM GMT

PDB ID : 3GKU
Title : Crystal structure of a probable RNA-binding protein from Clostridium symbiosum ATCC 14940
Authors : Tan, K.; Keigher, L.; Jedrzejczak, R.; Babnigg, G.; Joachimiak, A.; Midwest Center for Structural Genomics (MCSG)
Deposited on : 2009-03-11
Resolution : 2.95 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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
Mogul : 1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
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) : trunk26865

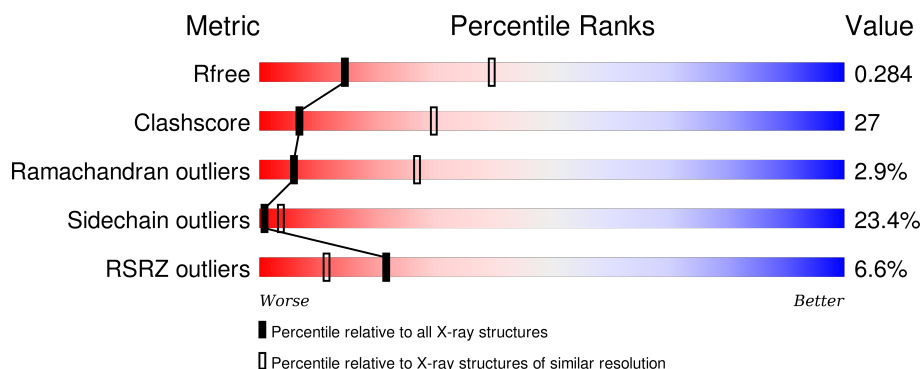
1 Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.95 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}	91344	2184 (3.00-2.92)
Clashscore	102246	2552 (3.00-2.92)
Ramachandran outliers	100387	2468 (3.00-2.92)
Sidechain outliers	100360	2471 (3.00-2.92)
RSRZ outliers	91569	2201 (3.00-2.92)

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	225	<div> <div>9%</div> <div>44%39%8%8%</div> </div>
1	B	225	<div> <div>9%</div> <div>44%30%11%14%</div> </div>
1	C	225	<div> <div>6%</div> <div>27%25%7%40%</div> </div>

2 Entry composition

There is only 1 type of molecule in this entry. The entry contains 4131 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 RNA-binding protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	206	Total	C	N	O	Se	0	0	0
			1636	1020	287	323	6			
1	B	193	Total	C	N	O	Se	0	0	0
			1500	934	263	297	6			
1	C	134	Total	C	N	O	Se	0	0	0
			995	619	163	208	5			

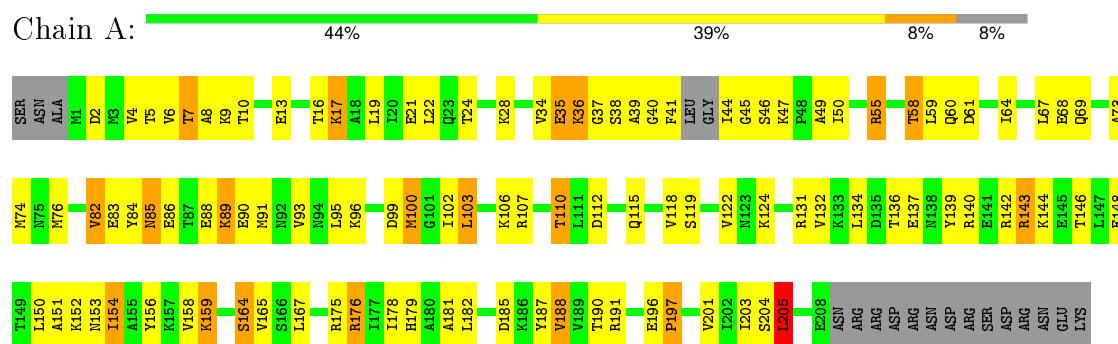
There are 9 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	SER	-	EXPRESSION TAG	PDB 3GKU
A	-1	ASN	-	EXPRESSION TAG	PDB 3GKU
A	0	ALA	-	EXPRESSION TAG	PDB 3GKU
B	-2	SER	-	EXPRESSION TAG	PDB 3GKU
B	-1	ASN	-	EXPRESSION TAG	PDB 3GKU
B	0	ALA	-	EXPRESSION TAG	PDB 3GKU
C	-2	SER	-	EXPRESSION TAG	PDB 3GKU
C	-1	ASN	-	EXPRESSION TAG	PDB 3GKU
C	0	ALA	-	EXPRESSION TAG	PDB 3GKU

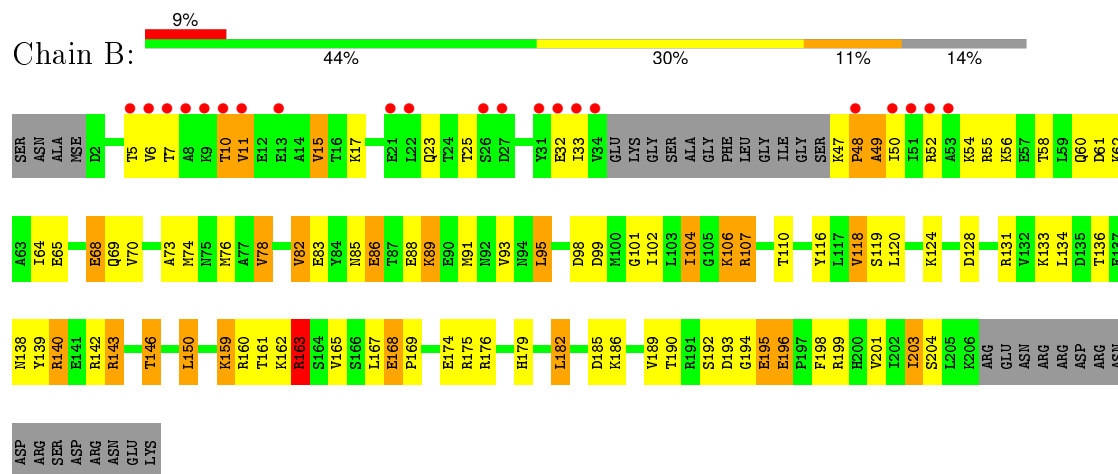
3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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.

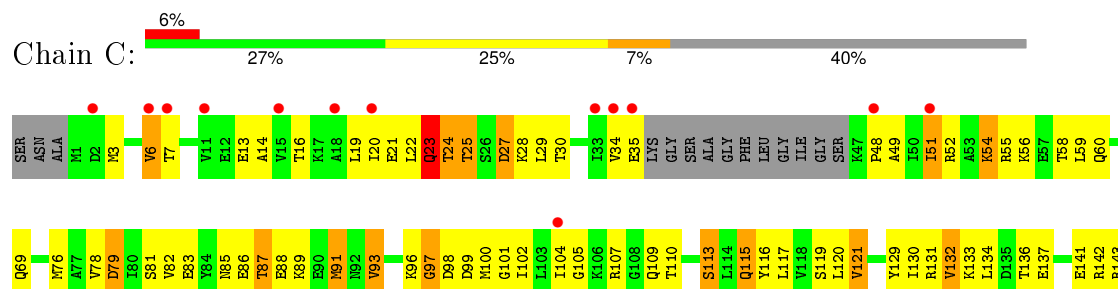
• Molecule 1: Probable RNA-binding protein



• Molecule 1: Probable RNA-binding protein



• Molecule 1: Probable RNA-binding protein



K144	THR
E146	LEU
	GLU
	THR
	LEU
	ALA
	LYS
	ASN
	ILE
	ALA
	TYR
	LYS
	VAL
	LYS
	ARG
	THR
	LYS
	ARG
	SER
	VAL
	SER
	LEU
	GLU
	PRO
	PRO
	ASN
	TYR
	GLU
	ARG
	ARG
	ILE
	ILE
	HIS
	ALA
	ALA
	LEU
	GLN
	ASN
	ASP
	LYS
	TYR
	VAL
	VAL
	THR
	ARG
	SER
	ASP
	GLY
	GLU
	PRO
	PHE
	ARG
	HIS
	VAL
	ILE
	ILE

SER
LEU
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ARG
GLU
ASN
ARG
ARG
ASP
ARG
ASN
ASP
ARG
SER
ASP
ARG
ASN
GLU
LYS

4 Data and refinement statistics

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, α , β , γ	126.99Å 126.99Å 106.19Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	40.72 – 2.95 40.73 – 2.95	Depositor EDS
% Data completeness (in resolution range)	99.8 (40.72-2.95) 99.8 (40.73-2.95)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.43 (at 2.95Å)	Xtriage
Refinement program	REFMAC 5.5.0054	Depositor
R, R_{free}	0.220 , 0.287 0.219 , 0.284	Depositor DCC
R_{free} test set	1084 reflections (5.42%)	DCC
Wilson B-factor (Å ²)	59.8	Xtriage
Anisotropy	0.104	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 56.2	EDS
Estimated twinning fraction	0.035 for -h,-k,l	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Outliers	0 of 21096 reflections	Xtriage
F_o, F_c correlation	0.92	EDS
Total number of atoms	4131	wwPDB-VP
Average B, all atoms (Å ²)	45.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.85% 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, 0.375 respectively for untwinned datasets, and 0.333, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

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	1.03	0/1645	0.98	2/2200 (0.1%)
1	B	0.82	0/1508	0.84	0/2027
1	C	0.67	0/994	0.80	1/1337 (0.1%)
All	All	0.88	0/4147	0.89	3/5564 (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	C	0	1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	97	GLY	N-CA-C	6.51	129.37	113.10
1	A	205	LEU	CA-CB-CG	5.38	127.69	115.30
1	A	67	LEU	CB-CG-CD1	-5.36	101.89	111.00

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	24	THR	Peptide

5.2 Too-close contacts

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	1636	0	1673	87	0
1	B	1500	0	1483	65	0
1	C	995	0	949	73	0
All	All	4131	0	4105	221	0

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 27.

The worst 5 of 221 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:103:LEU:HD23	1:A:103:LEU:H	1.02	1.13
1:C:100:MSE:HE2	1:C:136:THR:HG22	1.24	1.12
1:A:110:THR:HG22	1:B:116:TYR:HE2	1.08	1.10
1:C:97:GLY:HA2	1:C:100:MSE:HG2	1.29	1.10
1:C:100:MSE:HE2	1:C:136:THR:CG2	1.86	1.05

There are no symmetry-related clashes.

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	202/225 (90%)	179 (89%)	22 (11%)	1 (0%)	34	74
1	B	189/225 (84%)	161 (85%)	17 (9%)	11 (6%)	2	10
1	C	130/225 (58%)	110 (85%)	17 (13%)	3 (2%)	8	34
All	All	521/675 (77%)	450 (86%)	56 (11%)	15 (3%)	6	27

5 of 15 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	45	GLY
1	B	107	ARG
1	C	23	GLN
1	C	48	PRO
1	B	17	LYS

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	181/195 (93%)	147 (81%)	34 (19%)	2	8
1	B	161/195 (83%)	117 (73%)	44 (27%)	0	2
1	C	103/195 (53%)	77 (75%)	26 (25%)	1	3
All	All	445/585 (76%)	341 (77%)	104 (23%)	1	4

5 of 104 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	89	LYS
1	B	131	ARG
1	C	93	VAL
1	B	95	LEU
1	B	107	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	200	HIS
1	B	200	HIS
1	B	75	ASN
1	A	153	ASN
1	B	153	ASN

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](#)

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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	199/225 (88%)	-0.17	0 100 100	17, 32, 56, 70	0
1	B	187/225 (83%)	0.36	21 (11%) 7 4	27, 46, 82, 92	0
1	C	128/225 (56%)	0.41	13 (10%) 9 5	38, 56, 71, 77	0
All	All	514/675 (76%)	0.17	34 (6%) 22 11	17, 44, 72, 92	0

The worst 5 of 34 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	6	VAL	5.6
1	B	8	ALA	4.8
1	B	9	LYS	4.8
1	B	7	THR	4.5
1	B	48	PRO	4.4

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](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.