



# wwPDB X-ray Structure Validation Summary Report ⓘ

May 28, 2020 – 09:15 pm BST

PDB ID : 2BA1  
Title : Archaeal exosome core  
Authors : Hopfner, K.P.; Buttner, K.; Wenig, K.  
Deposited on : 2005-10-13  
Resolution : 2.70 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](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.

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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  
Xtriage (Phenix) : **NOT EXECUTED**  
EDS : **NOT EXECUTED**  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.11

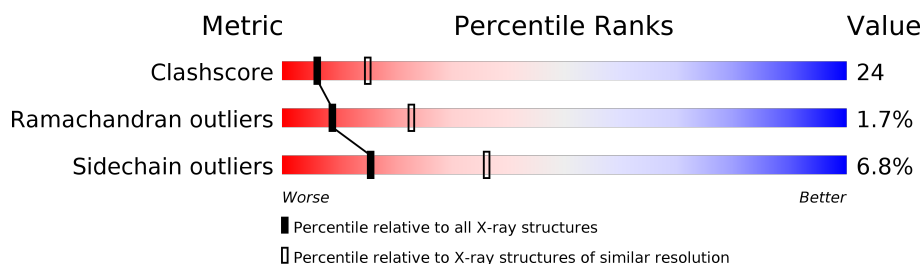
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.70 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))
Clashscore	141614	3122 (2.70-2.70)
Ramachandran outliers	138981	3069 (2.70-2.70)
Sidechain outliers	138945	3069 (2.70-2.70)


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  $\geq 3$ , 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  $\leq 5\%$ .

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	179	
1	B	179	
1	C	179	
2	D	258	
2	E	258	
2	F	258	
3	G	259	
3	H	259	

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Mol	Chain	Length	Quality of chain
3	I	259	 A horizontal bar chart showing the quality of chain I. The bar is divided into three segments: green (59%), yellow (32%), and orange (5%). The percentages are labeled below the bar.

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 15740 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 Archaeal exosome RNA binding protein CSL4.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	179	Total	C	N	O	S	0	0	0
			1371	855	242	266	8			
1	C	179	Total	C	N	O	S	19	0	0
			1371	855	242	266	8			
1	B	179	Total	C	N	O	S	23	0	0
			1371	855	242	266	8			

- Molecule 2 is a protein called Archaeal exosome complex exonuclease RRP41.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	E	245	Total	C	N	O	S	0	0	0
			1921	1209	339	360	13			
2	D	245	Total	C	N	O	S	3	0	0
			1921	1209	339	360	13			
2	F	245	Total	C	N	O	S	9	0	0
			1921	1209	339	360	13			

- Molecule 3 is a protein called Archaeal exosome complex exonuclease RRP42.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	H	247	Total	C	N	O	S	3	0	0
			1926	1213	320	387	6			
3	G	247	Total	C	N	O	S	21	0	0
			1926	1213	320	387	6			
3	I	247	Total	C	N	O	S	14	0	0
			1926	1213	320	387	6			

- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total	Zn	0	0
			1	1		

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total 1	Zn 1	0	0
4	C	1	Total 1	Zn 1	0	0

- Molecule 5 is water.

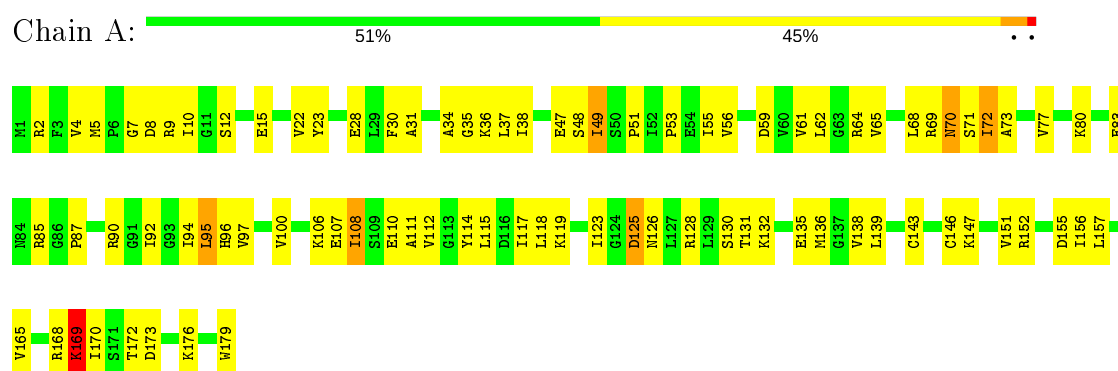
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total 1	O 1	0	0
5	C	2	Total 2	O 2	0	0
5	E	8	Total 8	O 8	0	0
5	D	9	Total 9	O 9	0	0
5	F	22	Total 22	O 22	0	0
5	H	13	Total 13	O 13	0	0
5	G	5	Total 5	O 5	0	0
5	I	23	Total 23	O 23	0	0

### 3 Residue-property plots [i](#)

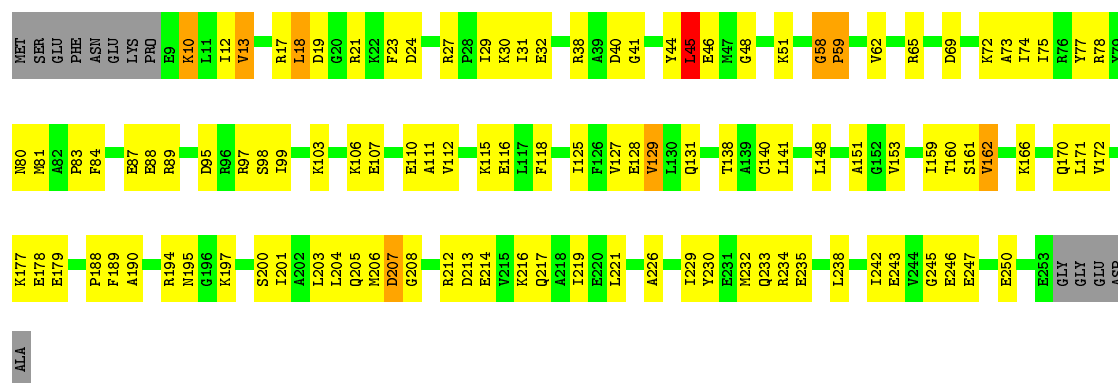
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according 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. 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.

Note EDS was not executed.

- Molecule 1: Archaeal exosome RNA binding protein CSL4

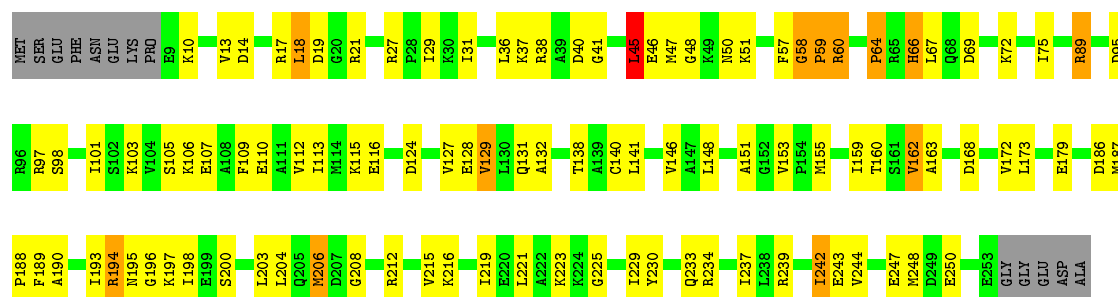


Chain E: 



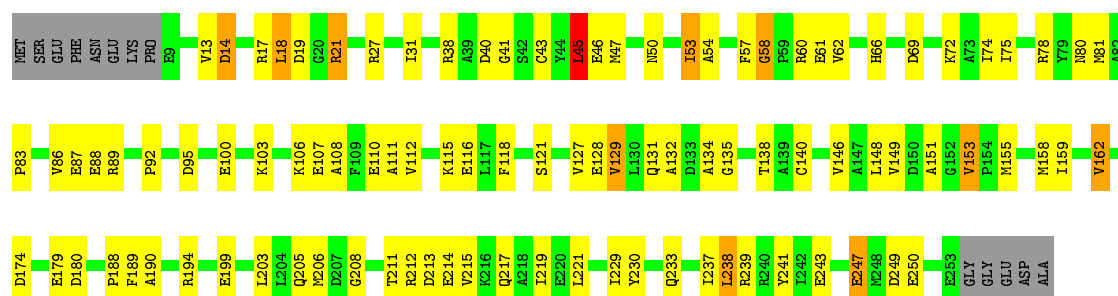
- Molecule 2: Archaeal exosome complex exonuclease RRP41

Chain D: 



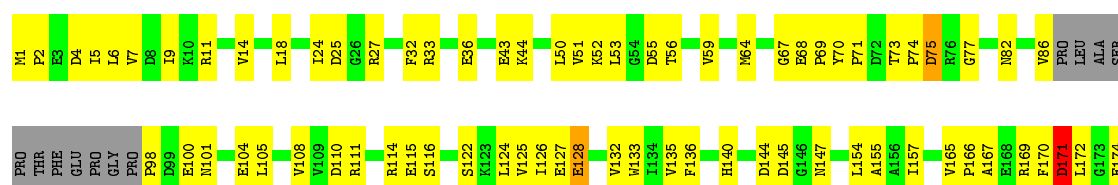
- Molecule 2: Archaeal exosome complex exonuclease RRP41

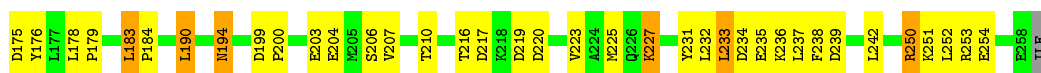
Chain F: 



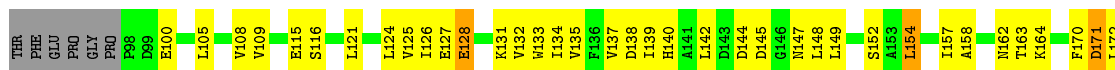
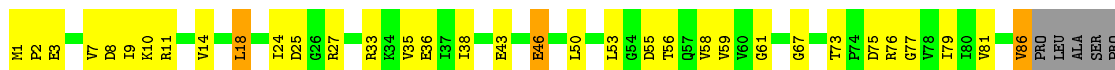
- Molecule 3: Archaeal exosome complex exonuclease RRP42

Chain H: 

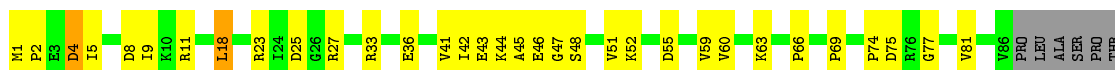




• Molecule 3: Archaeal exosome complex exonuclease RRP42



• Molecule 3: Archaeal exosome complex exonuclease RRP42





## 4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 43 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	137.46Å 137.46Å 261.01Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.70	Depositor
% Data completeness (in resolution range)	(Not available) (20.00-2.70)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.08	Depositor
Refinement program	CNS 1.1	Depositor
R, $R_{free}$	0.224 , 0.275	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	15740	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	66.0	wwPDB-VP

## 5 Model quality ⓘ

### 5.1 Standard geometry ⓘ

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	0.32	0/1385	0.59	0/1855
1	B	0.27	0/1385	0.56	0/1855
1	C	0.30	0/1385	0.57	0/1855
2	D	0.40	0/1947	0.68	1/2612 (0.0%)
2	E	0.38	0/1947	0.65	1/2612 (0.0%)
2	F	0.42	0/1947	0.69	1/2612 (0.0%)
3	G	0.35	0/1949	0.60	0/2638
3	H	0.39	0/1949	0.66	0/2638
3	I	0.40	0/1949	0.66	0/2638
All	All	0.37	0/15843	0.64	3/21315 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	45	LEU	CA-CB-CG	7.16	131.77	115.30
2	F	45	LEU	CA-CB-CG	6.32	129.83	115.30
2	E	45	LEU	CA-CB-CG	5.93	128.94	115.30

There are no chirality outliers.

There are no planarity outliers.

### 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	1371	0	1408	85	0
1	B	1371	0	1409	98	0
1	C	1371	0	1408	81	0
2	D	1921	0	1971	109	0
2	E	1921	0	1971	109	0
2	F	1921	0	1971	79	0
3	G	1926	0	1951	113	0
3	H	1926	0	1951	100	0
3	I	1926	0	1951	93	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
5	A	1	0	0	0	0
5	C	2	0	0	0	0
5	D	9	0	0	1	0
5	E	8	0	0	0	0
5	F	22	0	0	0	0
5	G	5	0	0	0	0
5	H	13	0	0	1	0
5	I	23	0	0	3	0
All	All	15740	0	15991	767	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 24.

The worst 5 of 767 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:C:117:ILE:HG21	3:H:9:ILE:HD11	1.29	1.09
2:E:112:VAL:HG21	2:E:159:ILE:HD11	1.10	1.05
2:D:31:ILE:HG12	2:D:45:LEU:HD22	1.43	1.00
1:A:119:LYS:HG2	1:A:136:MET:HE1	1.44	0.99
3:G:76:ARG:HH21	3:G:121:LEU:HD12	1.26	0.94

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	177/179 (99%)	159 (90%)	15 (8%)	3 (2%)	9	23
1	B	177/179 (99%)	143 (81%)	26 (15%)	8 (4%)	2	5
1	C	177/179 (99%)	154 (87%)	22 (12%)	1 (1%)	25	50
2	D	243/258 (94%)	227 (93%)	11 (4%)	5 (2%)	7	18
2	E	243/258 (94%)	223 (92%)	15 (6%)	5 (2%)	7	18
2	F	243/258 (94%)	233 (96%)	8 (3%)	2 (1%)	19	43
3	G	243/259 (94%)	219 (90%)	22 (9%)	2 (1%)	19	43
3	H	243/259 (94%)	224 (92%)	14 (6%)	5 (2%)	7	18
3	I	243/259 (94%)	228 (94%)	13 (5%)	2 (1%)	19	43
All	All	1989/2088 (95%)	1810 (91%)	146 (7%)	33 (2%)	9	23

5 of 33 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	108	ILE
1	B	112	VAL
2	E	58	GLY
2	D	58	GLY
2	F	58	GLY

### 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	149/149 (100%)	141 (95%)	8 (5%)	22	47
1	B	149/149 (100%)	138 (93%)	11 (7%)	13	32
1	C	149/149 (100%)	139 (93%)	10 (7%)	16	37
2	D	204/214 (95%)	192 (94%)	12 (6%)	19	43
2	E	204/214 (95%)	189 (93%)	15 (7%)	13	32
2	F	204/214 (95%)	183 (90%)	21 (10%)	7	16
3	G	217/227 (96%)	202 (93%)	15 (7%)	15	35
3	H	217/227 (96%)	204 (94%)	13 (6%)	19	42
3	I	217/227 (96%)	205 (94%)	12 (6%)	21	46
All	All	1710/1770 (97%)	1593 (93%)	117 (7%)	16	36

5 of 117 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	200	SER
2	F	66	HIS
3	I	154	LEU
2	D	221	LEU
2	F	43	CYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 29 such sidechains are listed below:

Mol	Chain	Res	Type
2	D	66	HIS
2	D	170	GLN
3	G	147	ASN
2	D	80	ASN
2	D	228	GLN

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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 3 ligands modelled in this entry, 3 are 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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

### 6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

### 6.4 Ligands

EDS was not executed - this section is therefore empty.

### 6.5 Other polymers

EDS was not executed - this section is therefore empty.