



Full wwPDB X-ray Structure Validation Report

Feb 27, 2014 – 11:19 PM GMT

PDB ID : 1HC8
Title : CRYSTAL STRUCTURE OF A CONSERVED RIBOSOMAL PROTEIN-
RNA COMPLEX
Authors : Conn, G.L.; Draper, D.E.; Lattman, E.E.; Gittis, A.G.
Deposited on : 2001-04-27
Resolution : 2.80 Å(reported)

This is a full wwPDB 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/ValidationPDFNotes.html>

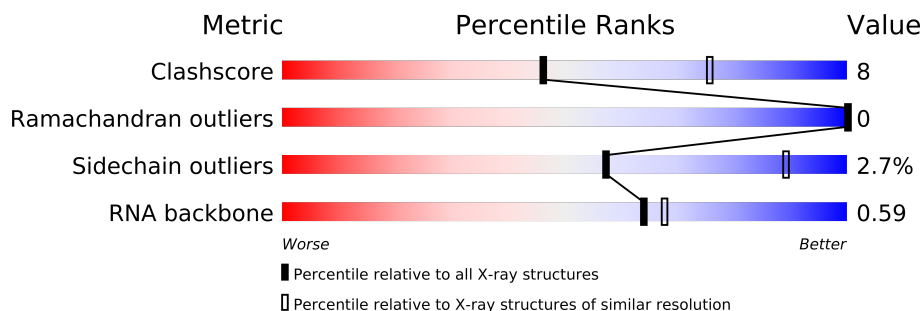
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467
Mogul : 1.15 2013
Xtriage (Phenix) : **NOT EXECUTED**
EDS : **NOT EXECUTED**
Percentile statistics : 21963
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et. al. (1996)
Validation Pipeline (wwPDB-VP) : stable22683

1 Overall quality at a glance

The reported resolution of this entry is 2.80 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))
Clashscore	79885	2295 (2.80-2.80)
Ramachandran outliers	78287	2252 (2.80-2.80)
Sidechain outliers	78261	2254 (2.80-2.80)
RNA backbone	1838	1076 (3.30-2.30)

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. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	76	
1	B	76	
2	C	58	
2	D	58	

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 3607 atoms, of which 0 are hydrogen and 0 are deuterium.

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 RIBOSOMAL PROTEIN L11.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	74	Total	C	N	O	S	0	0	0
			547	341	99	103	4			
1	B	70	Total	C	N	O	S	0	0	0
			516	319	95	98	4			

- Molecule 2 is a RNA chain called 58 NUCLEOTIDE RIBOSOMAL 23S RNA DOMAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	58	Total	C	N	O	P	0	0	0
			1252	556	229	407	60			
2	D	58	Total	C	N	O	P	0	0	0
			1252	556	229	407	60			

- Molecule 3 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	D	11	Total	Mg	0	0
			11	11		
3	C	10	Total	Mg	0	0
			10	10		

- Molecule 4 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	D	1	Total	K	0	0
			1	1		
4	C	1	Total	K	0	0
			1	1		

- Molecule 5 is OSMIUM ION (three-letter code: OS) (formula: Os).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	D	2	Total	Os	0	0
			2	2		
5	C	2	Total	Os	0	0
			2	2		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	1	Total	O	0	0
			1	1		
6	B	1	Total	O	0	0
			1	1		
6	C	6	Total	O	0	0
			6	6		
6	D	5	Total	O	0	0
			5	5		

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.

Note EDS was not executed.

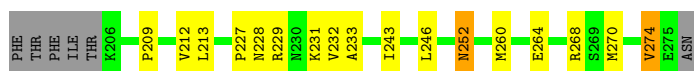
- Molecule 1: RIBOSOMAL PROTEIN L11

Chain A: 



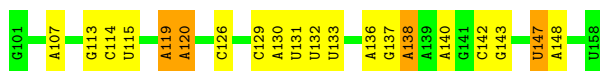
- Molecule 1: RIBOSOMAL PROTEIN L11

Chain B: 



- Molecule 2: 58 NUCLEOTIDE RIBOSOMAL 23S RNA DOMAIN

Chain C: 



- Molecule 2: 58 NUCLEOTIDE RIBOSOMAL 23S RNA DOMAIN

Chain D: 



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	150.68Å 150.68Å 63.84Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 2.80	Depositor
% Data completeness (in resolution range)	94.5 (20.00-2.80)	Depositor
R_{merge}	0.24	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS 0.9	Depositor
R, R_{free}	0.217 , 0.253	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3607	wwPDB-VP
Average B, all atoms (Å ²)	52.0	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: GTP, K, OS, MG

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	0/551	0.58	0/739
1	B	0.34	0/519	0.60	0/695
2	C	0.42	0/1366	0.71	1/2127 (0.0%)
2	D	0.41	0/1366	0.68	0/2127
All	All	0.40	0/3802	0.67	1/5688 (0.0%)

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
2	C	0	4
2	D	0	4
All	All	0	8

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	119	A	N9-C1'-C2'	5.36	120.97	114.00

There are no chirality outliers.

All (8) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	C	119	A	Sidechain
2	C	136	A	Sidechain
2	C	137	G	Sidechain

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Mol	Chain	Res	Type	Group
2	C	147	U	Sidechain
2	D	328	U	Sidechain
2	D	344	U	Sidechain
2	D	345	A	Sidechain
2	D	347	U	Sidechain

5.2 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 hydrogens added by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, and the number in parentheses is this value normalized per 1000 atoms of the molecule in the chain. The Symm-Clashes column gives symmetry related clashes, in the same way as for the Clashes column.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	547	0	582	23	0
1	B	516	0	553	14	0
2	C	1252	0	626	12	0
2	D	1252	0	626	7	0
3	C	10	0	0	0	0
3	D	11	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
5	C	2	0	0	0	0
5	D	2	0	0	0	0
6	A	1	0	0	0	0
6	B	1	0	0	0	0
6	C	6	0	0	0	0
6	D	5	0	0	0	0
All	All	3607	0	2387	49	0

Clashscore is defined as the number of clashes calculated for the entry per 1000 atoms (including hydrogens) of the entry. The overall clashscore for this entry is 8.

All (49) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:4:ILE:O	1:A:4:ILE:HD12	1.79	0.82
1:A:34:THR:HG22	1:A:73:VAL:HB	1.64	0.78
1:B:260:MET:O	1:B:264:GLU:HG3	1.87	0.74
1:A:32:VAL:O	1:A:32:VAL:HG22	1.89	0.72

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:A:48:MET:HE3	1:A:51:LEU:HB2	1.73	0.71
2:C:114:C:H2'	2:C:115:U:O4'	1.96	0.64
1:A:41:ARG:O	1:A:45:GLU:HG3	2.02	0.60
1:A:38:ASP:O	1:A:42:GLU:HG3	2.01	0.59
1:B:209:PRO:O	1:B:212:VAL:HG22	2.03	0.59
2:D:331:U:H2'	2:D:332:U:C6	2.39	0.58
1:A:60:MET:O	1:A:64:GLU:HG3	2.05	0.56
1:A:32:VAL:O	1:A:32:VAL:CG2	2.53	0.56
1:A:9:PRO:O	1:A:12:VAL:HG12	2.06	0.56
1:B:246:LEU:HD23	1:B:246:LEU:O	2.09	0.53
1:B:270:MET:HG2	2:D:313:G:H4'	1.89	0.52
1:B:232:VAL:O	1:B:232:VAL:HG22	2.08	0.52
1:A:26:GLU:HA	2:C:126:C:O2'	2.09	0.52
1:B:228:ASN:HD21	1:B:229:ARG:NH1	2.08	0.52
1:B:252:ASN:HD22	1:B:252:ASN:H	1.56	0.52
2:D:328:U:H5''	2:D:329:C:OP1	2.10	0.51
1:A:61:ARG:HH11	1:A:61:ARG:HG2	1.76	0.51
2:C:147:U:H2'	2:C:148:A:H5'	1.93	0.50
1:A:61:ARG:HB3	2:C:130:A:O2'	2.11	0.50
1:A:57:GLU:H	1:A:57:GLU:CD	2.15	0.49
1:A:6:LYS:HG3	1:A:50:ASP:OD2	2.13	0.49
1:A:15:LYS:HE2	1:A:22:SER:HA	1.96	0.48
2:C:142:C:H2'	2:C:143:G:H5'	1.96	0.47
1:B:264:GLU:OE1	1:B:274:VAL:HG21	2.13	0.47
1:A:61:ARG:NH1	2:C:131:U:OP1	2.48	0.46
2:D:331:U:H2'	2:D:332:U:H6	1.78	0.46
1:B:227:PRO:O	1:B:231:LYS:HE3	2.16	0.46
1:B:268:ARG:NH1	2:D:329:C:H4'	2.30	0.46
2:D:303:C:O2'	2:D:304:A:H5'	2.17	0.45
2:C:132:U:H2'	2:C:133:U:O5'	2.16	0.45
1:B:232:VAL:O	1:B:233:ALA:HB2	2.17	0.45
1:B:213:LEU:CD1	1:B:243:ILE:HG23	2.45	0.45
1:B:209:PRO:HD2	1:B:212:VAL:HG21	1.98	0.45
2:C:142:C:C2'	2:C:143:G:H5'	2.47	0.45
1:A:35:ILE:O	1:A:74:VAL:HA	2.16	0.44
1:A:61:ARG:NH1	1:A:61:ARG:HG2	2.31	0.44
1:A:37:ARG:HG2	1:A:74:VAL:CG1	2.48	0.44
1:A:70:MET:HB3	2:C:113:G:H4'	2.00	0.44
2:C:138:A:H2'	2:C:138:A:N3	2.31	0.44
1:B:252:ASN:N	1:B:252:ASN:HD22	2.15	0.43
1:A:34:THR:HA	1:A:73:VAL:O	2.20	0.41
1:A:39:LYS:NZ	1:A:39:LYS:HB3	2.35	0.41

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Atom-1	Atom-2	Distance(Å)	Clash(Å)
2:D:338:A:H2'	2:D:338:A:N3	2.35	0.41
2:C:120:A:H2'	2:C:147:U:OP1	2.21	0.41
1:A:68:ARG:NH1	2:C:129:C:H4'	2.37	0.40

There are no symmetry-related clashes.

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	72/76 (95%)	69 (96%)	3 (4%)	0	100	100
1	B	68/76 (90%)	64 (94%)	4 (6%)	0	100	100
All	All	140/152 (92%)	133 (95%)	7 (5%)	0	100	100

There are no Ramachandran outliers to report.

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	57/60 (95%)	56 (98%)	1 (2%)	71	94
1	B	54/60 (90%)	52 (96%)	2 (4%)	45	81
All	All	111/120 (92%)	108 (97%)	3 (3%)	57	89

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	61	ARG

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Mol	Chain	Res	Type
1	B	252	ASN
1	B	274	VAL

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	30	ASN
1	B	252	ASN

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	C	56/58 (96%)	4 (7%)	0
2	D	56/58 (96%)	4 (7%)	0
All	All	112/116 (96%)	8 (7%)	0

All (8) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	C	107	A
2	C	120	A
2	C	138	A
2	C	140	A
2	D	320	A
2	D	328	U
2	D	329	C
2	D	338	A

There are no RNA pucker outliers to report.

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

2 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the chemical component dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	GTP	C	101	3,2	34,34,34	1.38	5 (14%)	51,54,54	2.71	4 (7%)
2	GTP	D	301	3,2	34,34,34	1.24	3 (8%)	51,54,54	3.32	3 (5%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the chemical component dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GTP	C	101	3,2	-	0/22/38/38	0/1/3/3
2	GTP	D	301	3,2	-	0/22/38/38	0/1/3/3

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	101	GTP	PG-O3B	4.55	1.68	1.60
2	D	301	GTP	PG-O3B	3.39	1.66	1.60
2	C	101	GTP	PB-O3B	2.54	1.64	1.59
2	D	301	GTP	PB-O3B	2.52	1.64	1.59
2	C	101	GTP	C6-N1	2.22	1.40	1.37
2	D	301	GTP	PA-O2A	-2.12	1.45	1.55
2	C	101	GTP	PA-O2A	-2.07	1.45	1.55
2	C	101	GTP	PA-O3A	-2.02	1.56	1.59

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	301	GTP	C6-C5-N7	-22.55	131.10	134.14
2	C	101	GTP	C6-C5-N7	-17.85	131.74	134.14
2	C	101	GTP	C6-N1-C2	3.16	125.03	119.51
2	D	301	GTP	C6-N1-C2	3.13	124.98	119.51
2	C	101	GTP	O3A-PB-O3B	2.92	107.61	101.66
2	D	301	GTP	O3A-PB-O3B	2.24	106.23	101.66
2	C	101	GTP	PA-O3A-PB	2.09	137.81	131.68

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

5.6 Ligand geometry ⓘ

Of 27 ligands modelled in this entry, 27 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.

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 ⓘ

EDS was not executed - this section will therefore be empty.

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

EDS was not executed - this section will therefore be empty.

6.3 Carbohydrates ⓘ

EDS was not executed - this section will therefore be empty.

6.4 Ligands ⓘ

EDS was not executed - this section will therefore be empty.

6.5 Other polymers ⓘ

EDS was not executed - this section will therefore be empty.