



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 5, 2026 – 10:45 PM UTC

PDB ID : 1Y69 / pdb_00001y69
Title : RRF domain I in complex with the 50S ribosomal subunit from *Deinococcus radiodurans*
Authors : Wilson, D.N.; Schlutzen, F.; Harms, J.M.; Yoshida, T.; Ohkubo, T.; Albrecht, R.; Buerger, J.; Kobayashi, Y.; Fucini, P.
Deposited on : 2004-12-04
Resolution : 3.33 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

<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

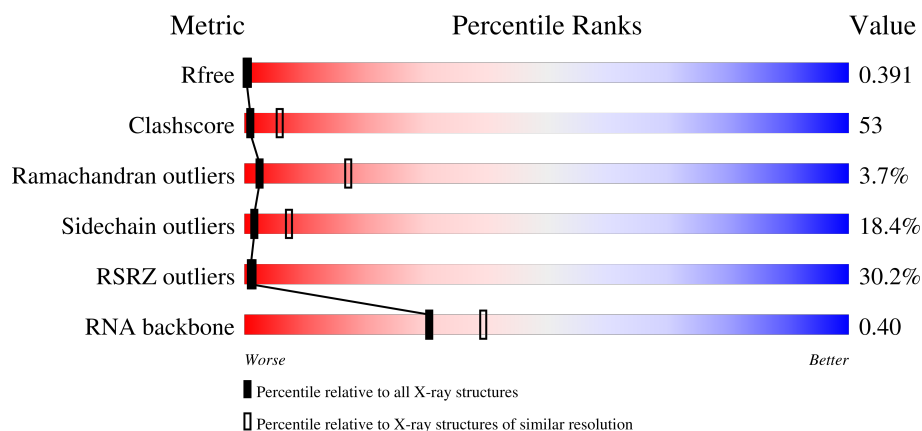
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.33 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	1434 (3.38-3.30)
Clashscore	190562	1479 (3.38-3.30)
Ramachandran outliers	187476	1456 (3.38-3.30)
Sidechain outliers	187428	1455 (3.38-3.30)
RSRZ outliers	180081	1434 (3.38-3.30)
RNA backbone	3983	1083 (3.68-3.00)

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	0	2880	28% 10% 60% 21% 6% .
2	9	124	53% 13% 68% 15% 5%
3	K	141	29% 33% 44% 18% . .
4	U	91	19% 41% 43% 9% 8%

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Mol	Chain	Length	Quality of chain
5	8	113	37% 38% 52% 8%

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 64484 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 RNA chain called 23S ribosomal RNA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	0	2766	Total	C	N	O	P	0	0	0
			59359	26479	10949	19166	2765			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
0	1526	U	C	conflict	GB 1026245073

- Molecule 2 is a RNA chain called 5S ribosomal RNA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	9	118	Total	C	N	O	P	0	0	0
			2516	1124	464	811	117			

- Molecule 3 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	K	136	Total	C	N	O	S	0	0	0
			1090	696	202	185	7			

- Molecule 4 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	U	84	Total	C	N	O	S	0	0	0
			625	393	122	109	1			

- Molecule 5 is a protein called Ribosome-recycling factor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
5	8	113	Total	C	N	O	S	0	0	0
			894	541	170	179	4			

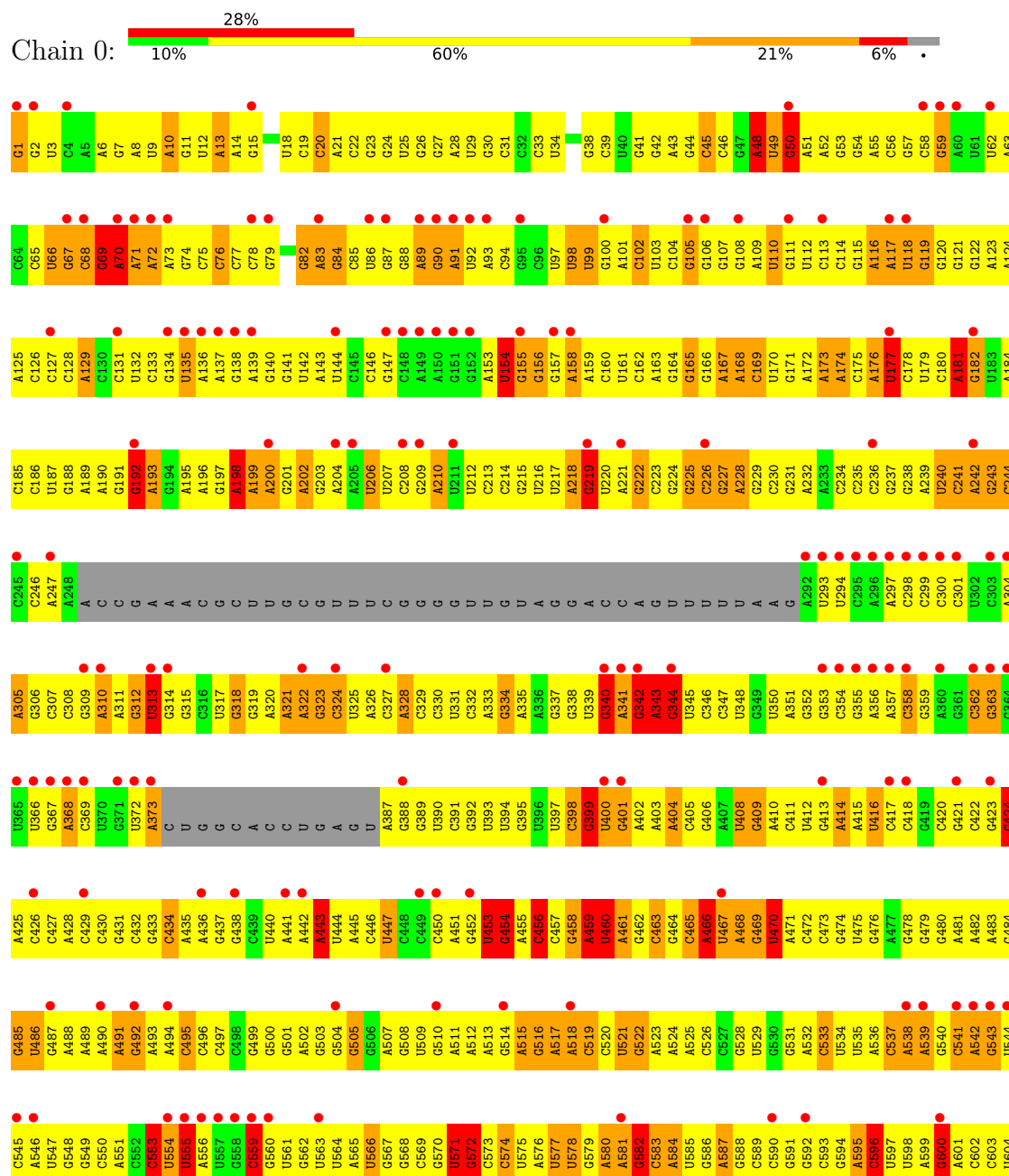
There are 3 discrepancies between the modelled and reference sequences:

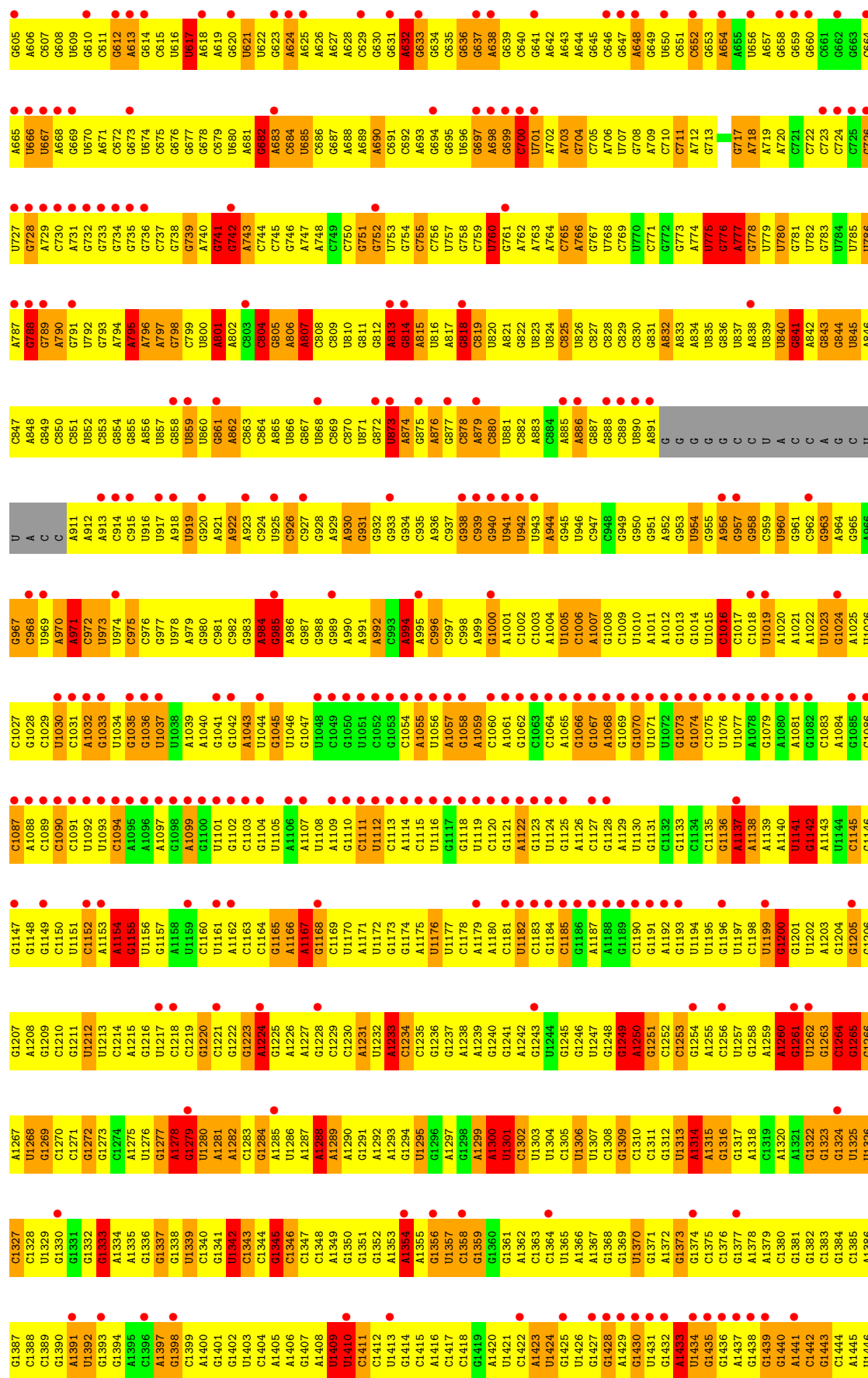
Chain	Residue	Modelled	Actual	Comment	Reference
8	31	GLY	-	linker	UNP P0A805
8	32	GLY	-	linker	UNP P0A805
8	33	GLY	-	linker	UNP P0A805

3 Residue-property plots

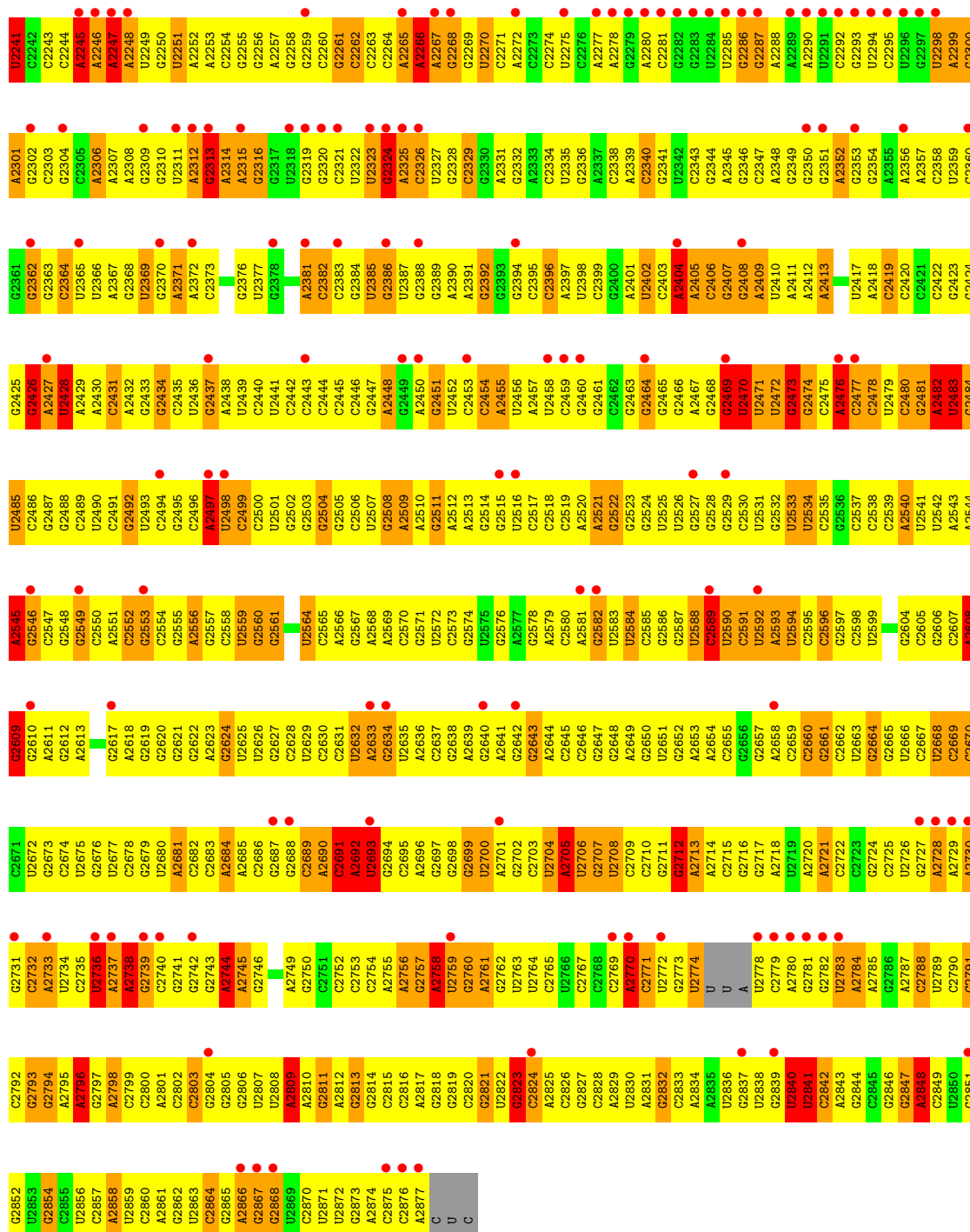
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: 23S ribosomal RNA

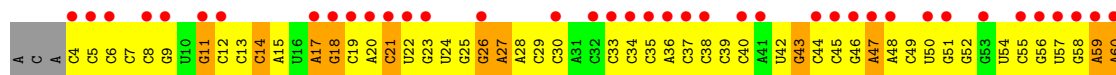
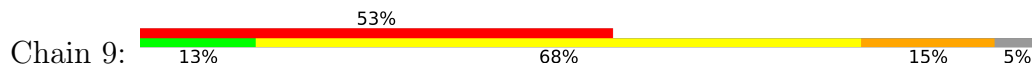


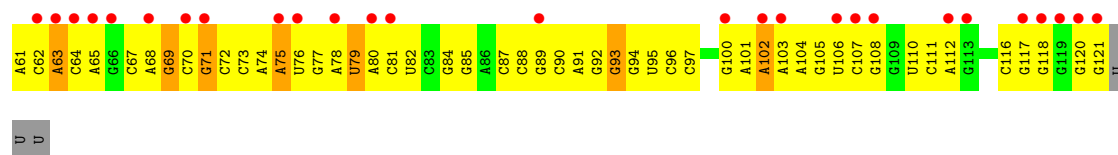




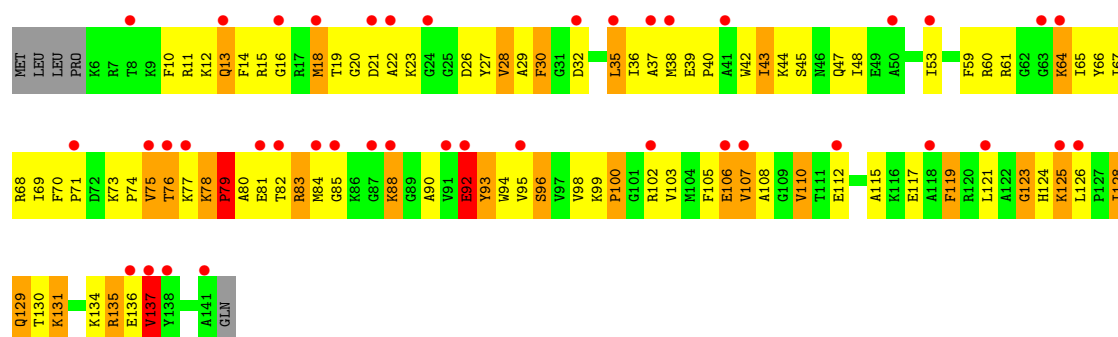


• Molecule 2: 5S ribosomal RNA

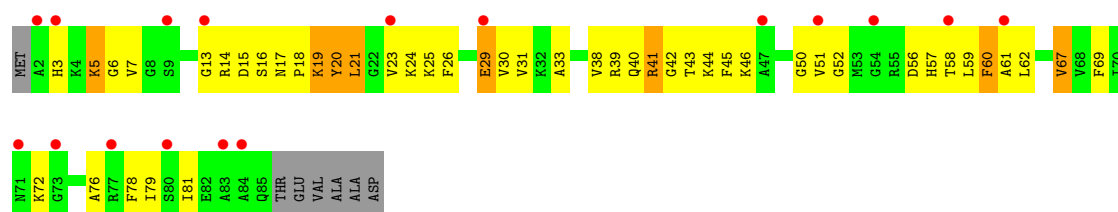
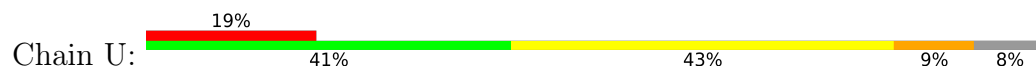




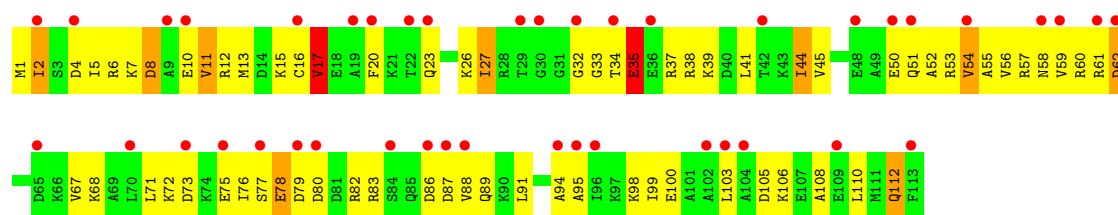
• Molecule 3: 50S ribosomal protein L16



• Molecule 4: 50S ribosomal protein L27



• Molecule 5: Ribosome-recycling factor



4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	168.70Å 405.00Å 693.00Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	8.13 – 3.33 8.13 – 3.33	Depositor EDS
% Data completeness (in resolution range)	74.5 (8.13-3.33) 82.9 (8.13-3.33)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.10	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.85 (at 3.31Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.275 , 0.338 0.364 , 0.391	Depositor DCC
R_{free} test set	15675 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	74.3	Xtriage
Anisotropy	0.779	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.19 , 13.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.45$, $\langle L^2 \rangle = 0.28$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.73	EDS
Total number of atoms	64484	wwPDB-VP
Average B, all atoms (Å ²)	50.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.27% 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

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	0	0.50	0/66467	0.89	212/103673 (0.2%)
2	9	0.41	0/2813	0.78	1/4384 (0.0%)
3	K	0.60	0/1113	1.00	3/1486 (0.2%)
4	U	0.58	0/633	0.92	2/838 (0.2%)
5	8	0.56	0/895	0.96	3/1189 (0.3%)
All	All	0.50	0/71921	0.89	221/111570 (0.2%)

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	0	0	217
2	9	0	2
All	All	0	219

There are no bond length outliers.

The worst 5 of 221 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	0	1301	U	C2'-C3'-O3'	10.61	125.42	109.50
1	0	1345	G	C4'-C3'-O3'	-9.51	98.73	113.00
1	0	1715	A	C2'-C3'-O3'	9.23	123.35	109.50
1	0	1314	A	C4'-C3'-O3'	-9.07	99.39	113.00
1	0	582	G	N9-C1'-C2'	9.05	127.58	114.00

There are no chirality outliers.

5 of 219 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	0	1	G	Sidechain

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Mol	Chain	Res	Type	Group
1	0	10	A	Sidechain
1	0	20	C	Sidechain
1	0	48	A	Sidechain
1	0	66	U	Sidechain

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	0	59359	0	29917	4720	0
2	9	2516	0	1286	166	0
3	K	1090	0	1125	186	0
4	U	625	0	655	85	0
5	8	894	0	925	104	0
All	All	64484	0	33908	5146	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 53.

The worst 5 of 5146 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)
1:0:1333:G:N2	1:0:1344:C:H41	1.39	1.21
1:0:2548:G:C2'	1:0:2549:G:H5''	1.73	1.17
1:0:1073:G:H2'	1:0:1074:G:H5''	1.18	1.17
1:0:1978:U:H3'	1:0:1979:C:H5''	1.28	1.15
3:K:76:THR:HG21	3:K:88:LYS:HB2	1.22	1.15

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	
3	K	134/141 (95%)	109 (81%)	19 (14%)	6 (4%)	2	13
4	U	82/91 (90%)	63 (77%)	16 (20%)	3 (4%)	2	17
5	8	111/113 (98%)	95 (86%)	13 (12%)	3 (3%)	4	22
All	All	327/345 (95%)	267 (82%)	48 (15%)	12 (4%)	2	17

5 of 12 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	K	79	PRO
5	8	112	GLN
3	K	80	ALA
3	K	135	ARG
4	U	13	GLY

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	
3	K	110/115 (96%)	84 (76%)	26 (24%)	1	3
4	U	62/67 (92%)	53 (86%)	9 (14%)	3	14
5	8	95/95 (100%)	81 (85%)	14 (15%)	3	14
All	All	267/277 (96%)	218 (82%)	49 (18%)	1	7

5 of 49 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	U	16	SER
5	8	2	ILE
4	U	19	LYS
4	U	58	THR
5	8	11	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 9 such sidechains are listed below:

Mol	Chain	Res	Type
5	8	58	ASN
5	8	89	GLN
4	U	40	GLN
4	U	57	HIS
5	8	23	GLN

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	0	2757/2880 (95%)	636 (23%)	121 (4%)
2	9	117/124 (94%)	16 (13%)	0
All	All	2874/3004 (95%)	652 (22%)	121 (4%)

5 of 652 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	0	45	C
1	0	48	A
1	0	49	U
1	0	50	G
1	0	51	A

5 of 121 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	0	1634	A
1	0	2592	U
1	0	1820	G
1	0	2588	U
1	0	2823	G

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 ⓘ

There are no oligosaccharides 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	0	2766/2880 (96%)	1.60	805 (29%) 1 1	20, 43, 100, 131	0
2	9	118/124 (95%)	2.19	66 (55%) 0 0	33, 70, 94, 106	0
3	K	136/141 (96%)	1.60	41 (30%) 1 1	20, 50, 68, 80	0
4	U	84/91 (92%)	1.26	17 (20%) 3 3	21, 49, 63, 66	0
5	8	113/113 (100%)	1.87	42 (37%) 1 1	28, 52, 66, 82	0
All	All	3217/3349 (96%)	1.62	971 (30%) 1 1	20, 45, 98, 131	0

The worst 5 of 971 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	0	1459	U	9.0
1	0	940	G	8.4
1	0	1812	U	8.3
1	0	1111	C	7.9
1	0	2782	G	7.8

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 [i](#)

There are no ligands in this entry.

6.5 Other polymers [i](#)

There are no such residues in this entry.