



wwPDB EM Validation Summary Report ⓘ

Mar 29, 2026 – 04:01 PM UTC

PDB ID : 4UY8 / pdb_00004uy8
EMDB ID : EMD-2773
Title : Molecular basis for the ribosome functioning as a L-tryptophan sensor - Cryo-EM structure of a TnaC stalled E.coli ribosome
Authors : Bischoff, L.; Berninghausen, O.; Beckmann, R.
Deposited on : 2014-08-29
Resolution : 3.80 Å(reported)

This is a wwPDB EM 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/EMValidationReportHelp>
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:

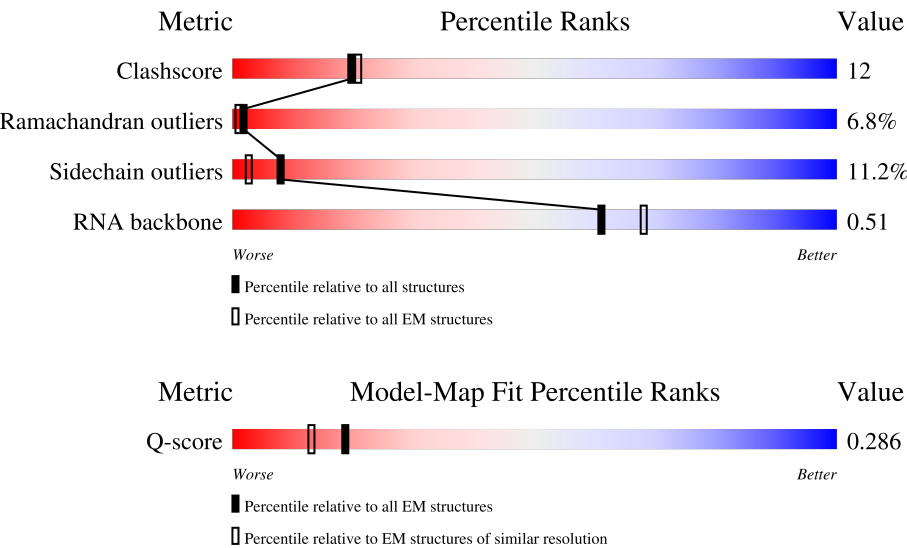
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDb archive up until May 2025)
MapQ : 1.9.13
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 i

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 3.80 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)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
RNA backbone	8273	3508	-
Q-score	-	25397	10198 (3.30 - 4.30)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	0	56	75% 68% 29% ..
2	1	50	94% 62% 30% 8%
3	2	46	59% 67% 28% .

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Mol	Chain	Length	Quality of chain
4	3	64	
5	4	38	
6	5	148	
7	6	30	
8	7	20	
9	8	94	
10	A	2854	
11	B	118	
12	C	271	
13	D	209	
14	E	201	
15	F	177	
16	G	176	
17	H	50	
18	I	141	
19	J	142	
20	K	122	
21	L	143	
22	M	136	
23	N	120	
24	O	116	
25	P	114	
26	Q	117	
27	R	103	
28	S	110	

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Mol	Chain	Length	Quality of chain
29	T	93	
30	U	102	
31	V	77	
32	W	79	
33	X	77	
34	Y	63	
35	Z	58	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
38	TRP	7	1001	-	-	X	-
38	TRP	7	1002	-	-	X	-

2 Entry composition

There are 39 unique types of molecules in this entry. The entry contains 92995 atoms, of which 8 are hydrogens and 0 are deuteriums.

In the tables below, 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 50S RIBOSOMAL PROTEIN L32.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	0	56	Total	C	N	O	S	0	0
			444	269	94	80	1		

- Molecule 2 is a protein called 50S RIBOSOMAL PROTEIN L33.

Mol	Chain	Residues	Atoms				AltConf	Trace
2	1	50	Total	C	N	O	0	0
			409	263	75	71		

- Molecule 3 is a protein called 50S RIBOSOMAL PROTEIN L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	2	46	Total	C	N	O	S	0	0
			377	228	90	57	2		

- Molecule 4 is a protein called 50S RIBOSOMAL PROTEIN L35.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	3	64	Total	C	N	O	S	0	0
			504	323	105	74	2		

- Molecule 5 is a protein called 50S RIBOSOMAL PROTEIN L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	4	38	Total	C	N	O	S	0	0
			302	185	65	48	4		

- Molecule 6 is a protein called 50S RIBOSOMAL PROTEIN L10.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	5	148	Total	C	N	O	S	0	0
			1117	705	196	209	7		

- Molecule 7 is a protein called RIBOSOMAL L7 PROTEIN.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	6	30	Total	C	N	O	S	0	0
			227	144	33	47	3		

- Molecule 8 is a protein called TRYPTOPHANASE.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	7	20	Total	C	N	O	S	0	0
			170	109	32	28	1		

- Molecule 9 is a protein called 50S RIBOSOMAL PROTEIN L25.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	8	94	Total	C	N	O	S	0	0
			753	479	137	134	3		

- Molecule 10 is a RNA chain called RRNA-23S RIBOSOMAL RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	A	2854	Total	C	N	O	P	0	0
			61274	27334	11279	19807	2854		

- Molecule 11 is a RNA chain called RRNA-5S RIBOSOMAL RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	B	118	Total	C	N	O	P	0	0
			2529	1126	464	821	118		

- Molecule 12 is a protein called 50S RIBOSOMAL PROTEIN L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	C	271	Total	C	N	O	S	0	0
			2082	1288	423	364	7		

- Molecule 13 is a protein called 50S RIBOSOMAL PROTEIN L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	D	209	Total	C	N	O	S	0	0
			1565	979	288	294	4		

- Molecule 14 is a protein called 50S RIBOSOMAL PROTEIN L4.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	E	201	Total	C	N	O	S	0	0
			1552	974	283	290	5		

- Molecule 15 is a protein called 50S RIBOSOMAL PROTEIN L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	F	177	Total	C	N	O	S	0	0
			1410	899	249	256	6		

- Molecule 16 is a protein called 50S RIBOSOMAL PROTEIN L6.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	G	176	Total	C	N	O	S	0	0
			1323	832	243	246	2		

- Molecule 17 is a protein called RIBOSOMAL PROTEIN L9.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	H	50	Total	C	N	O	S	0	0
			384	247	68	68	1		

- Molecule 18 is a protein called 50S RIBOSOMAL PROTEIN L11.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	I	141	Total	C	N	O	S	0	0
			1032	651	179	196	6		

- Molecule 19 is a protein called 50S RIBOSOMAL PROTEIN L13.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	J	142	Total	C	N	O	S	0	0
			1129	714	212	199	4		

- Molecule 20 is a protein called 50S RIBOSOMAL PROTEIN L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	K	122	Total	C	N	O	S	0	0
			938	587	180	165	6		

- Molecule 21 is a protein called 50S RIBOSOMAL PROTEIN L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	L	143	Total	C	N	O	S	0	0
			1045	649	206	189	1		

- Molecule 22 is a protein called 50S RIBOSOMAL PROTEIN L16.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	M	136	Total	C	N	O	S	0	0
			1074	686	205	177	6		

- Molecule 23 is a protein called 50S RIBOSOMAL PROTEIN L17.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	N	120	Total	C	N	O	S	0	0
			960	593	196	166	5		

- Molecule 24 is a protein called 50S RIBOSOMAL PROTEIN L18.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	O	116	Total	C	N	O		0	0
			892	552	178	162			

- Molecule 25 is a protein called 50S RIBOSOMAL PROTEIN L19.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	P	114	Total	C	N	O	S	0	0
			917	574	179	163	1		

- Molecule 26 is a protein called 50S RIBOSOMAL PROTEIN L20.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	Q	117	Total	C	N	O		0	0
			947	604	192	151			

- Molecule 27 is a protein called 50S RIBOSOMAL PROTEIN L21.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	R	103	Total	C	N	O	S	0	0
			816	516	153	145	2		

- Molecule 28 is a protein called 50S RIBOSOMAL PROTEIN L22.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	S	110	Total	C	N	O	S	0	0
			857	532	166	156	3		

- Molecule 29 is a protein called 50S RIBOSOMAL PROTEIN L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	T	93	Total	C	N	O	S	0	0
			738	466	139	131	2		

- Molecule 30 is a protein called 50S RIBOSOMAL PROTEIN L24.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	U	102	Total	C	N	O		0	0
			779	492	146	141			

- Molecule 31 is a RNA chain called RNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	V	77	Total	C	N	O	P	0	0
			1649	733	297	542	77		

- Molecule 32 is a protein called 50S RIBOSOMAL PROTEIN L27.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	W	79	Total	C	N	O	S	0	0
			596	367	120	108	1		

- Molecule 33 is a protein called 50S RIBOSOMAL PROTEIN L28.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	X	77	Total	C	N	O	S	0	0
			625	388	129	106	2		

- Molecule 34 is a protein called 50S RIBOSOMAL PROTEIN L29.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	Y	63	Total	C	N	O	S	0	0
			509	313	99	95	2		

- Molecule 35 is a protein called 50S RIBOSOMAL PROTEIN L30.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	Z	58	Total	C	N	O	S	0	0
			449	281	87	79	2		

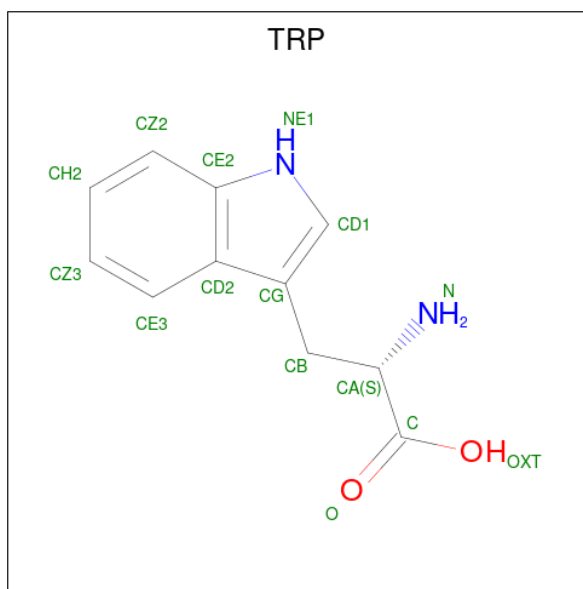
- Molecule 36 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
36	4	1	Total	Mg	0
			1	1	
36	A	135	Total	Mg	0
			135	135	
36	B	4	Total	Mg	0
			4	4	
36	C	2	Total	Mg	0
			2	2	
36	E	1	Total	Mg	0
			1	1	

- Molecule 37 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
37	4	1	Total	Zn	0
			1	1	

- Molecule 38 is TRYPTOPHAN (CCD ID: TRP) (formula: C₁₁H₁₂N₂O₂).



Mol	Chain	Residues	Atoms					AltConf
38	7	1	Total	C	H	N	O	0
			19	11	4	2	2	
38	7	1	Total	C	H	N	O	0
			19	11	4	2	2	

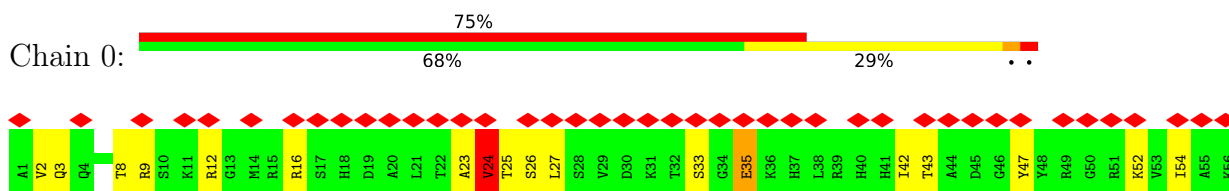
- Molecule 39 is water.

Mol	Chain	Residues	Atoms		AltConf
39	A	416	Total	O	0
			416	416	
39	B	14	Total	O	0
			14	14	
39	C	2	Total	O	0
			2	2	
39	D	3	Total	O	0
			3	3	
39	E	2	Total	O	0
			2	2	
39	L	2	Total	O	0
			2	2	

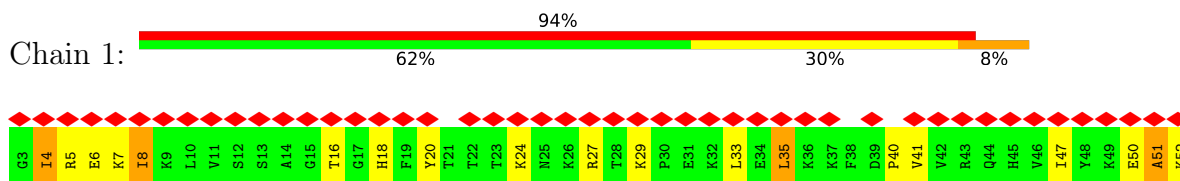
3 Residue-property plots

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 atom inclusion in map 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 diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). 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.

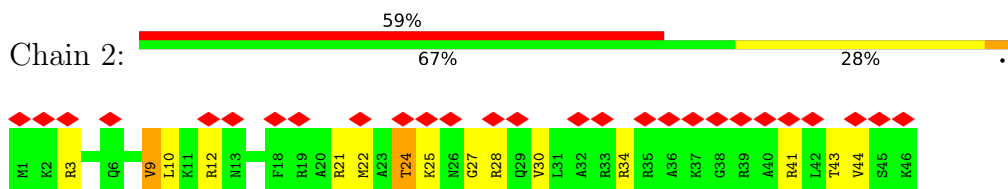
- Molecule 1: 50S RIBOSOMAL PROTEIN L32



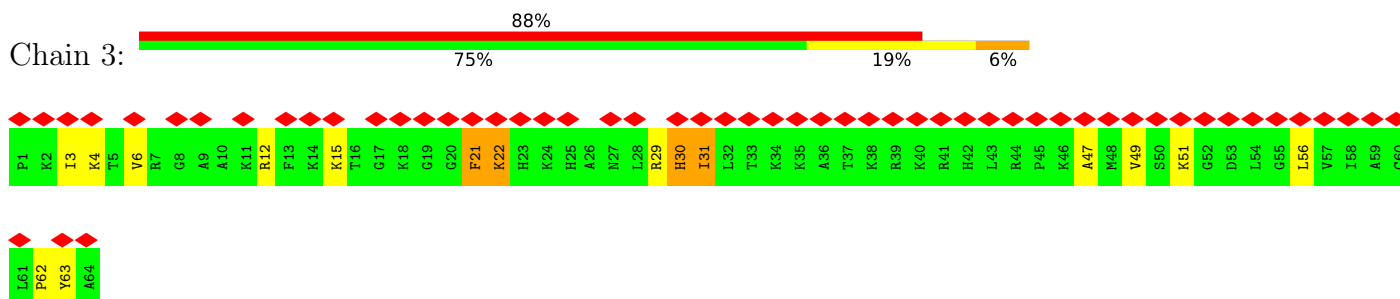
- Molecule 2: 50S RIBOSOMAL PROTEIN L33



- Molecule 3: 50S RIBOSOMAL PROTEIN L34

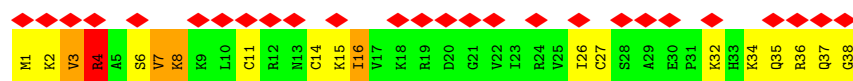


- Molecule 4: 50S RIBOSOMAL PROTEIN L35

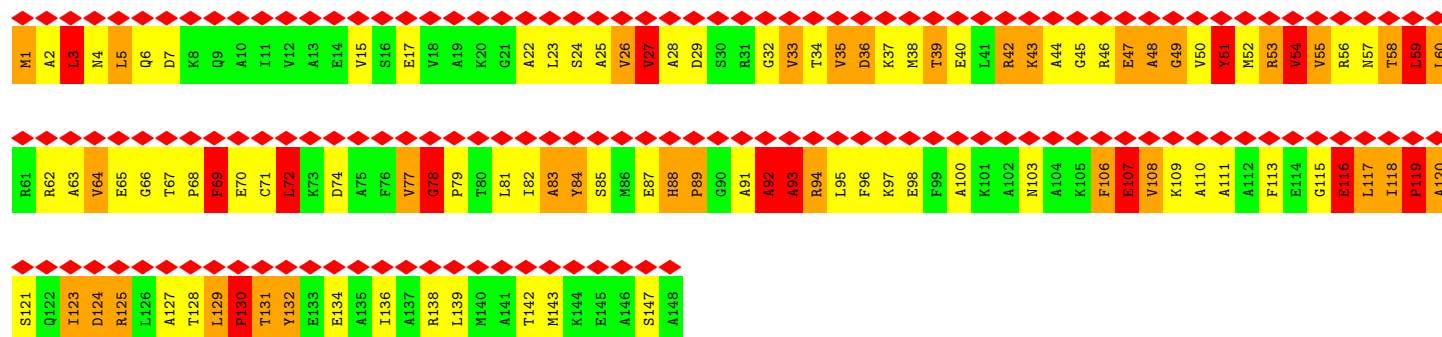


- Molecule 5: 50S RIBOSOMAL PROTEIN L36





• Molecule 6: 50S RIBOSOMAL PROTEIN L10



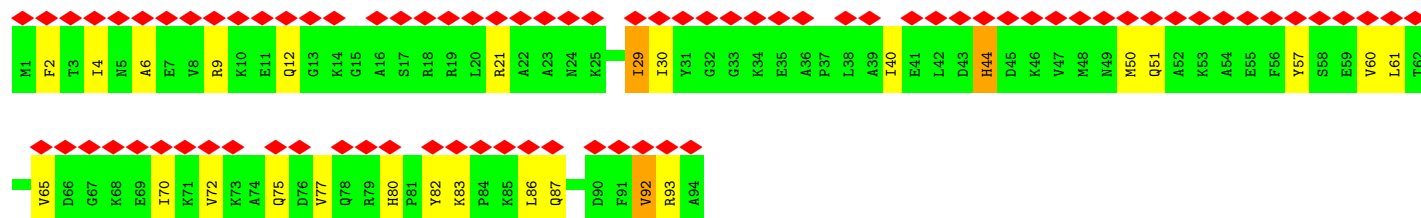
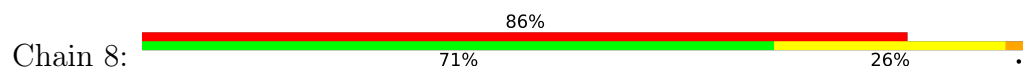
• Molecule 7: RIBOSOMAL L7 PROTEIN



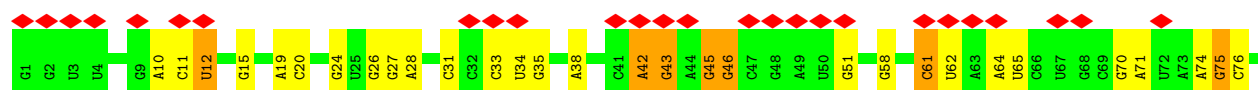
• Molecule 8: TRYPTOPHANASE

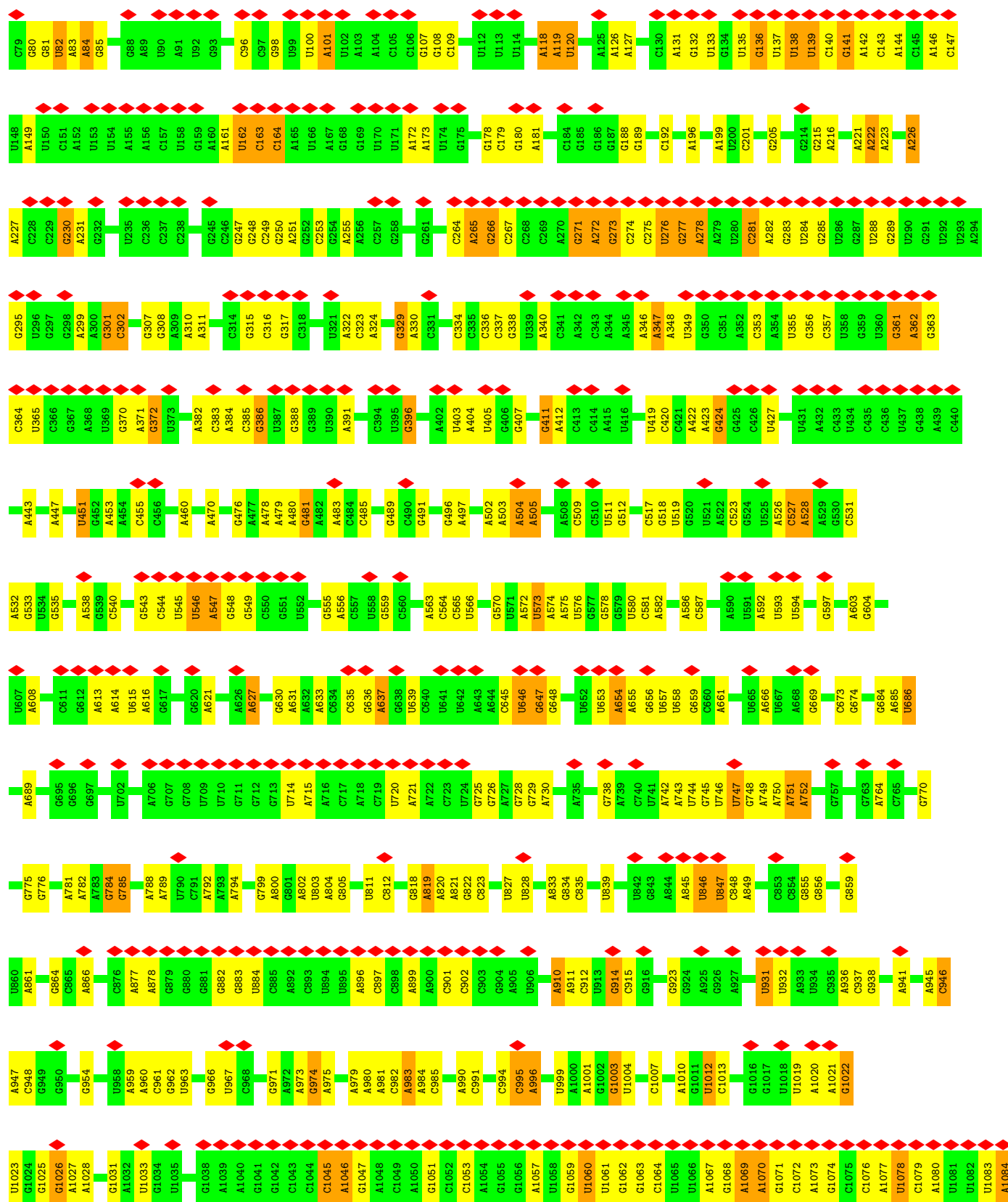


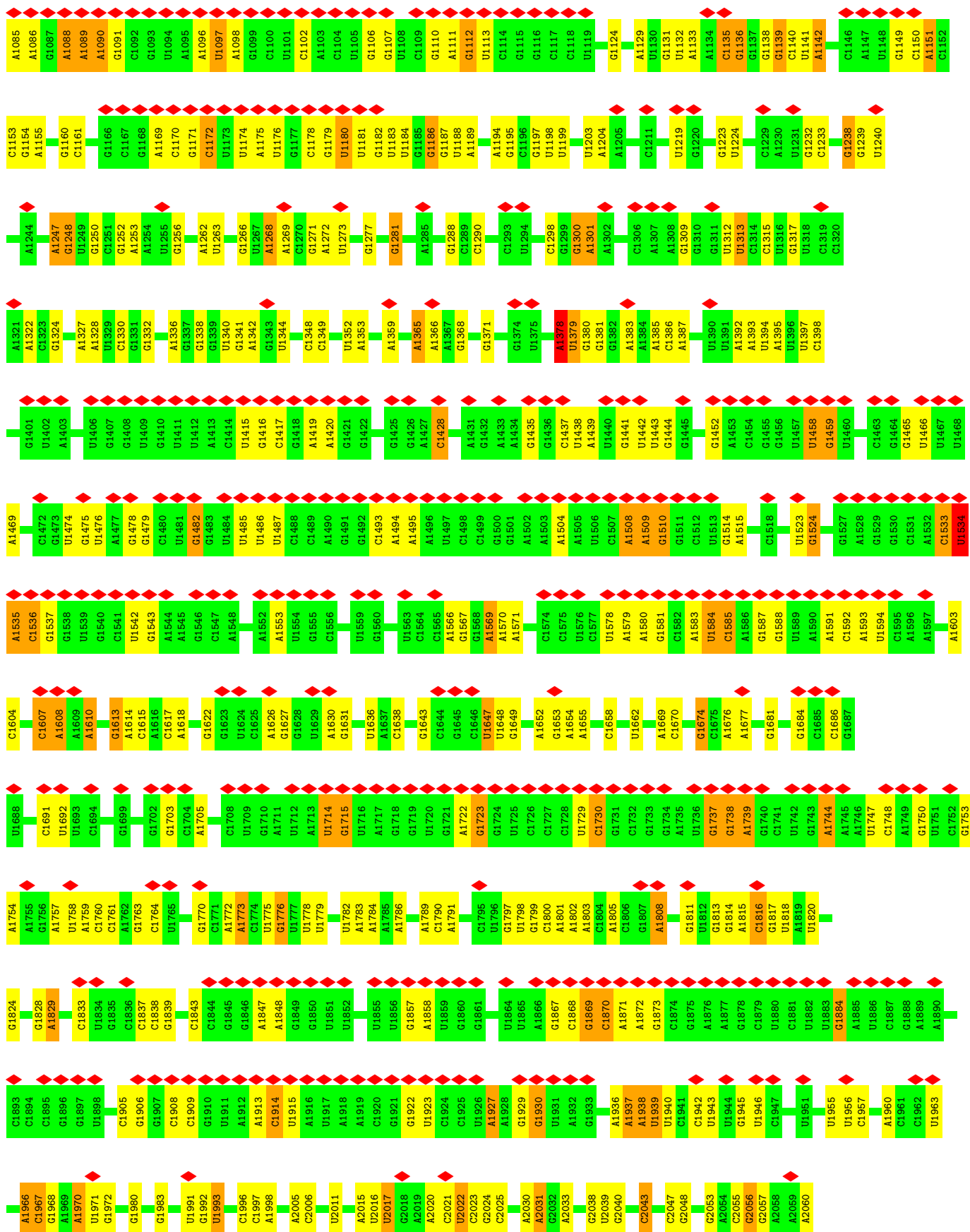
• Molecule 9: 50S RIBOSOMAL PROTEIN L25

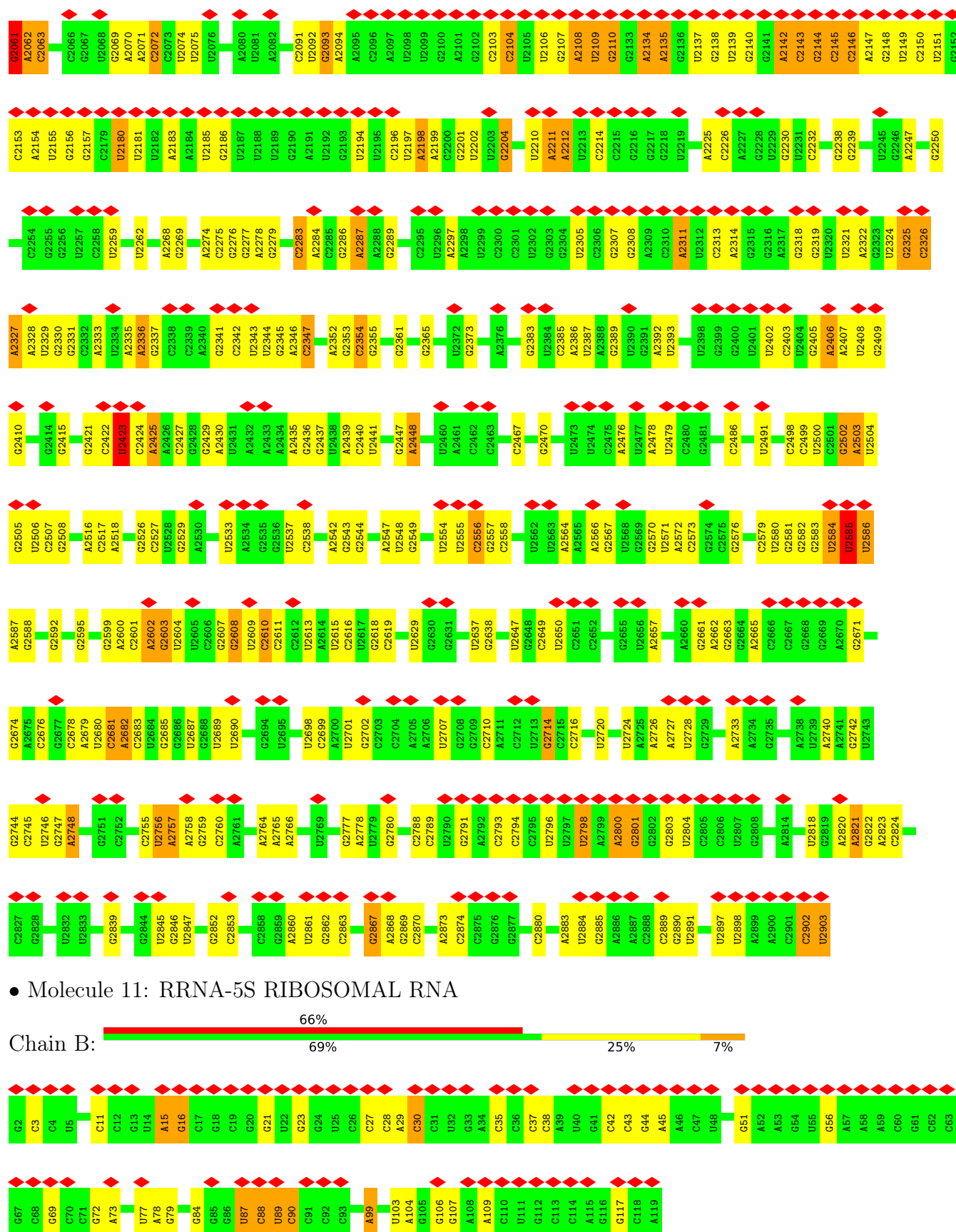


• Molecule 10: RRNA-23S RIBOSOMAL RNA

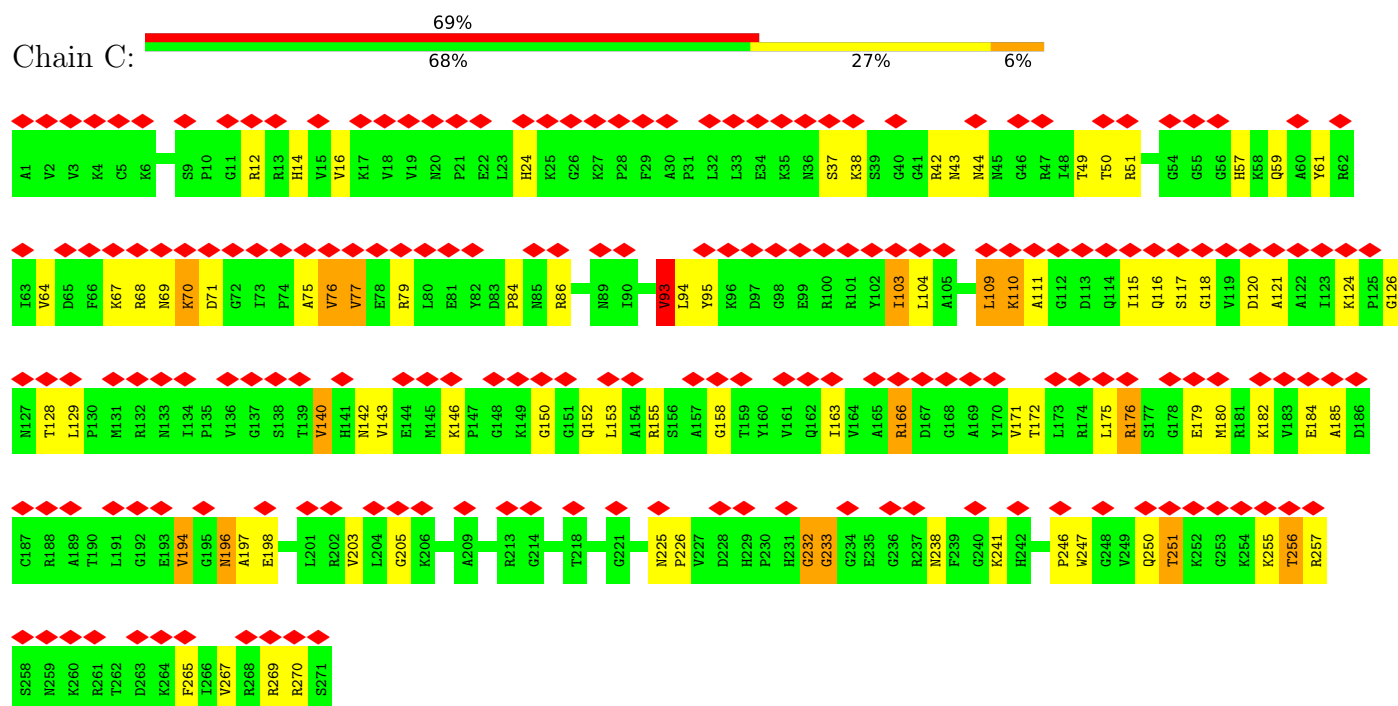








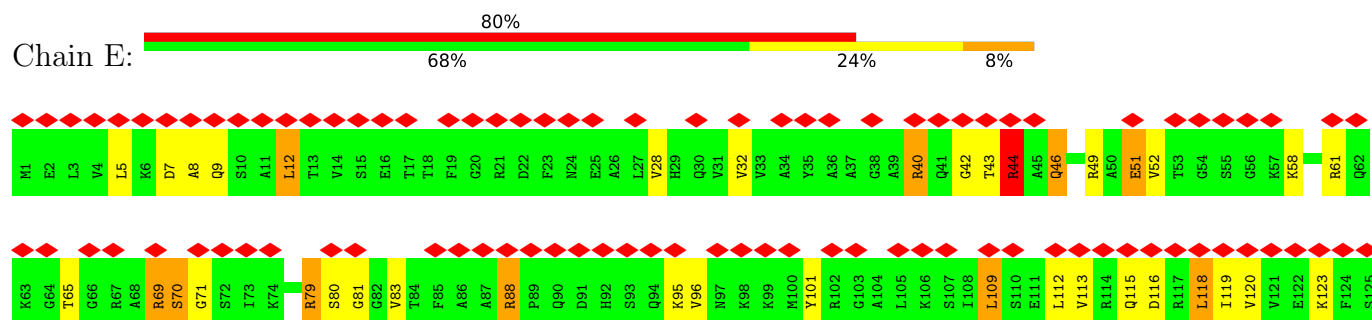
• Molecule 12: 50S RIBOSOMAL PROTEIN L2

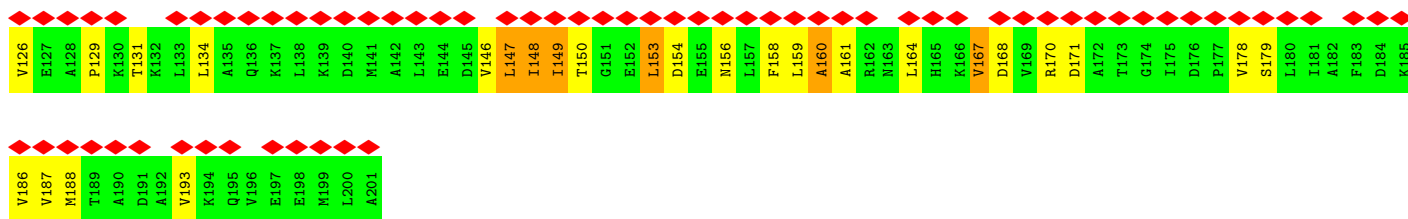


• Molecule 13: 50S RIBOSOMAL PROTEIN L3



• Molecule 14: 50S RIBOSOMAL PROTEIN L4

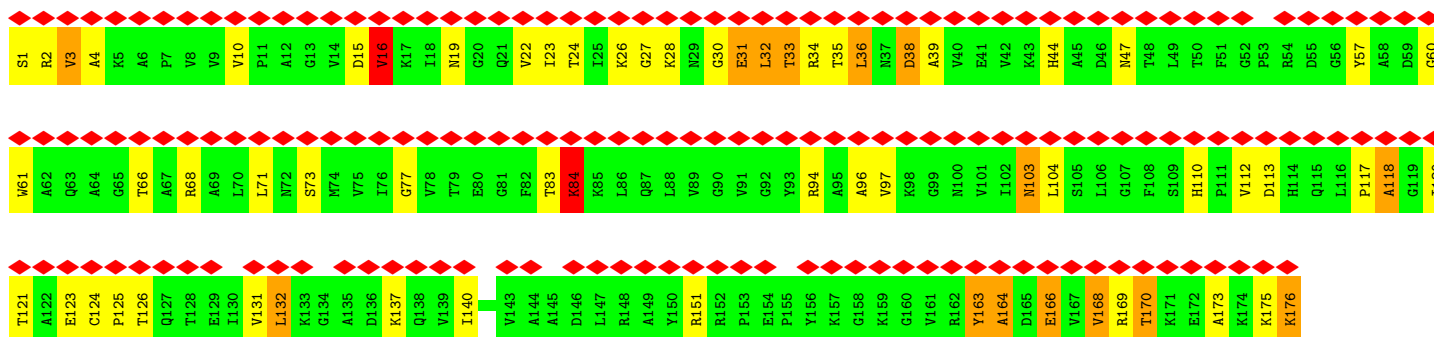




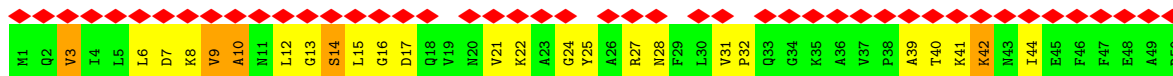
• Molecule 15: 50S RIBOSOMAL PROTEIN L5



• Molecule 16: 50S RIBOSOMAL PROTEIN L6

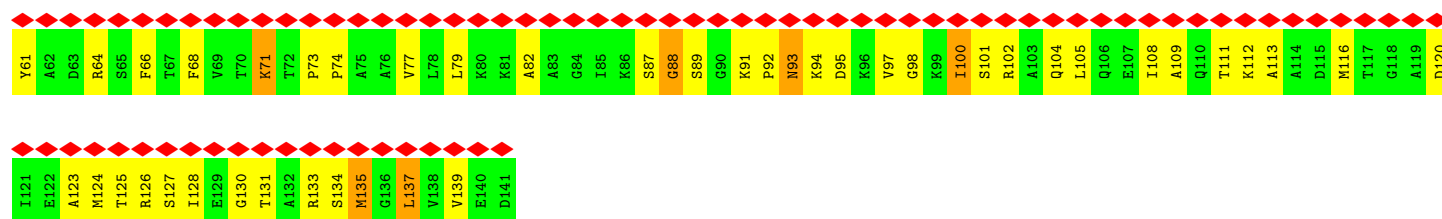


• Molecule 17: RIBOSOMAL PROTEIN L9

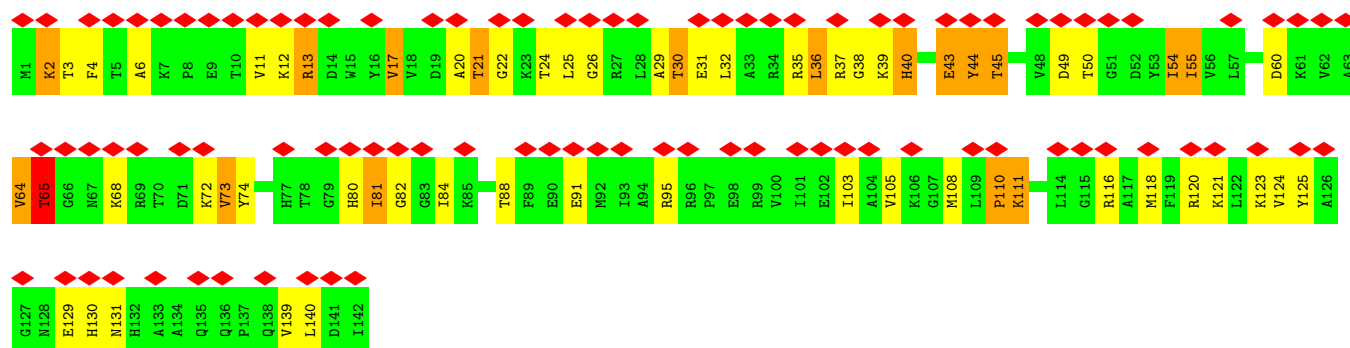


• Molecule 18: 50S RIBOSOMAL PROTEIN L11

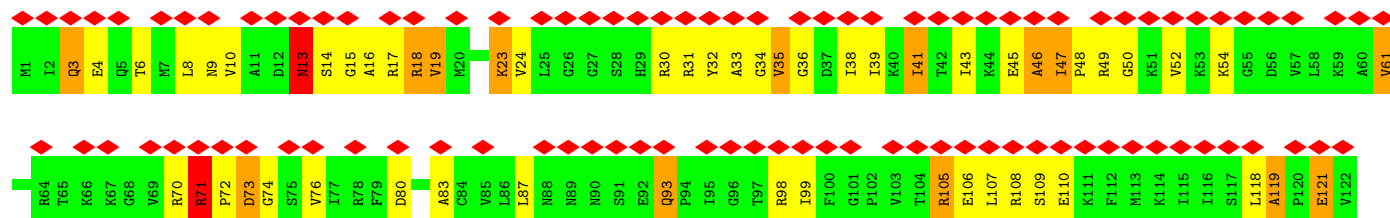
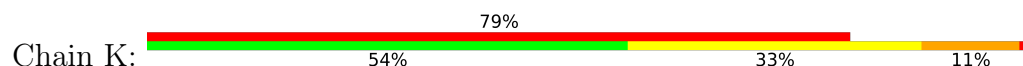




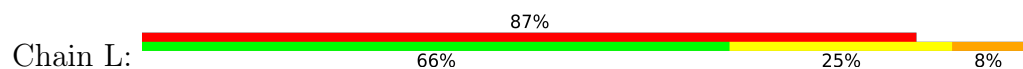
• Molecule 19: 50S RIBOSOMAL PROTEIN L13



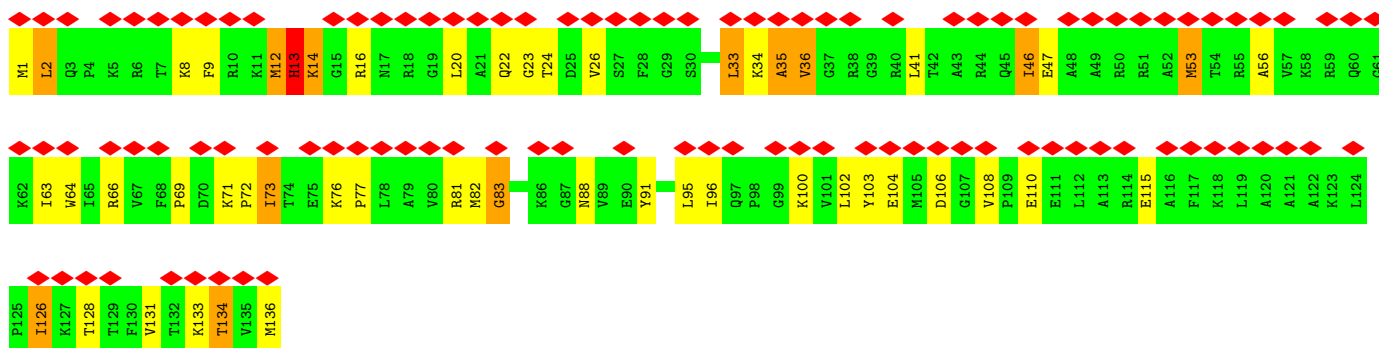
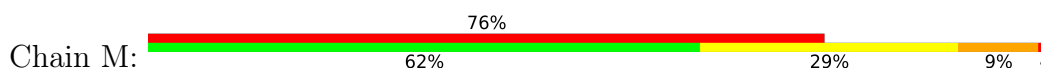
• Molecule 20: 50S RIBOSOMAL PROTEIN L14



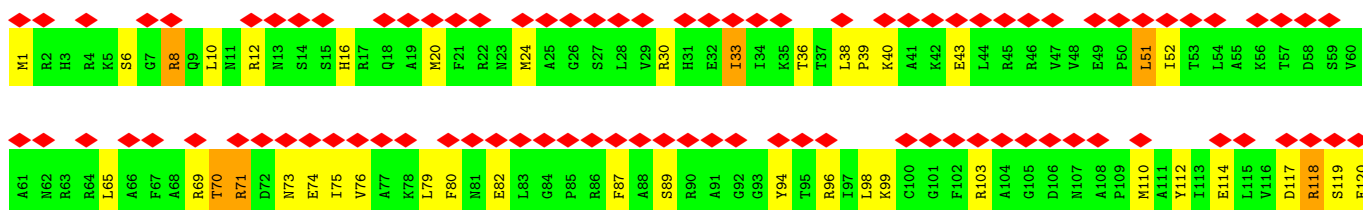
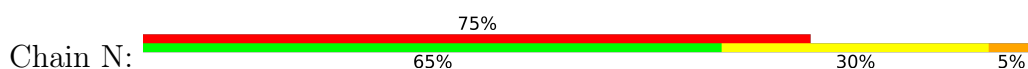
• Molecule 21: 50S RIBOSOMAL PROTEIN L15



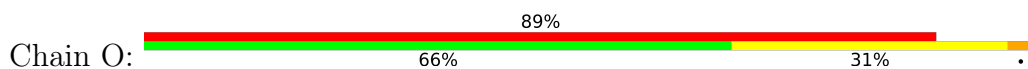
• Molecule 22: 50S RIBOSOMAL PROTEIN L16



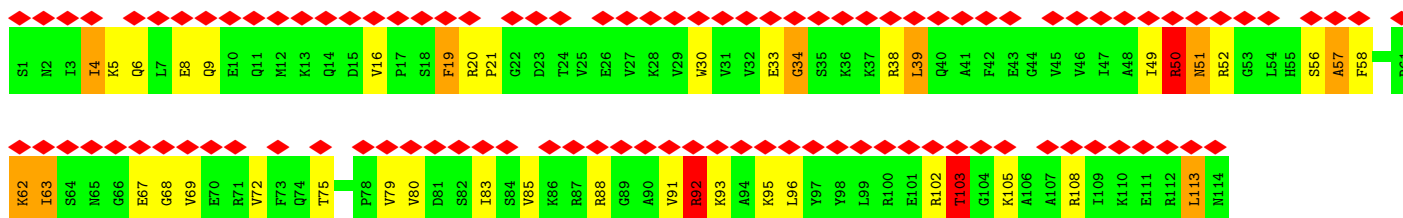
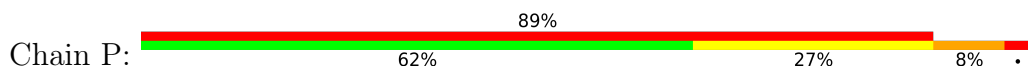
• Molecule 23: 50S RIBOSOMAL PROTEIN L17



• Molecule 24: 50S RIBOSOMAL PROTEIN L18

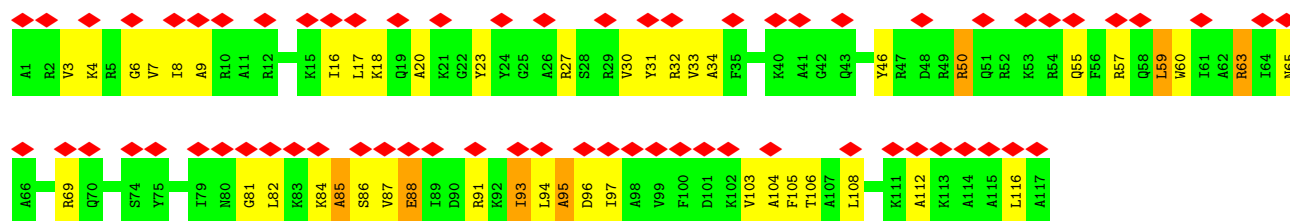


• Molecule 25: 50S RIBOSOMAL PROTEIN L19

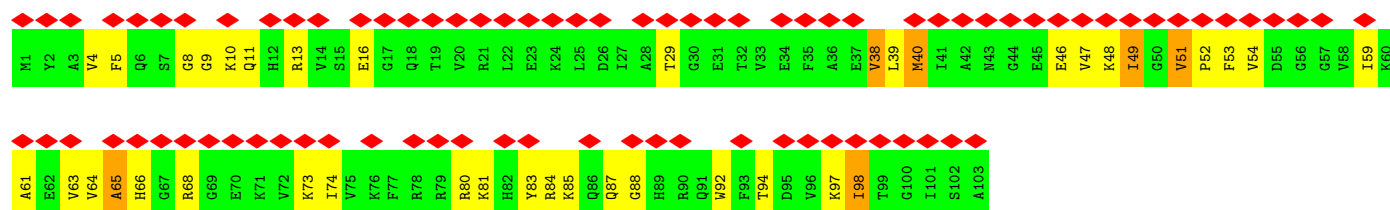
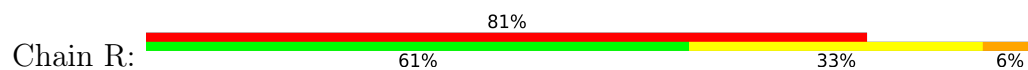


• Molecule 26: 50S RIBOSOMAL PROTEIN L20

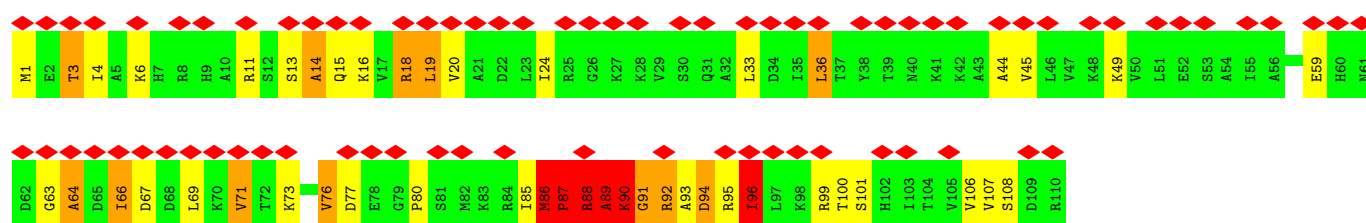




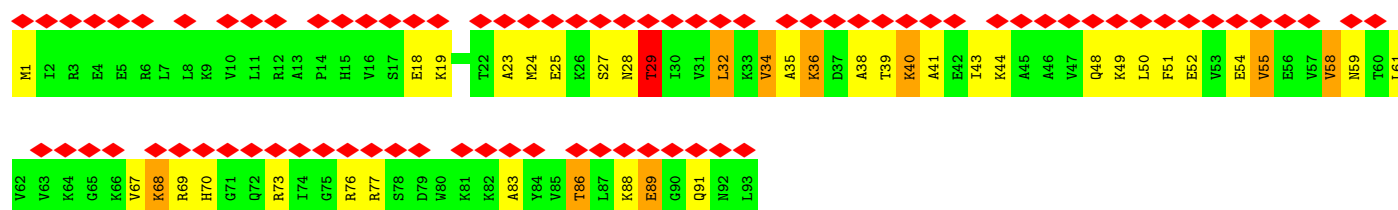
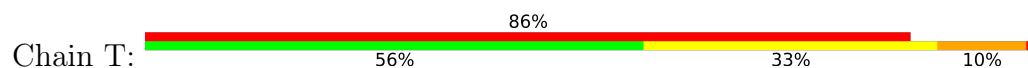
• Molecule 27: 50S RIBOSOMAL PROTEIN L21



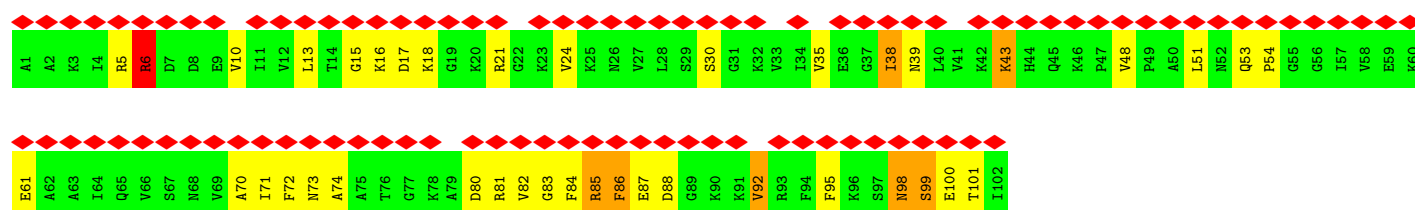
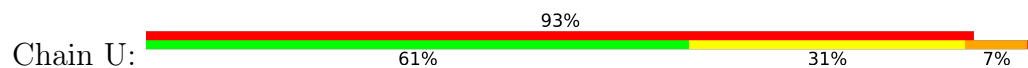
• Molecule 28: 50S RIBOSOMAL PROTEIN L22



• Molecule 29: 50S RIBOSOMAL PROTEIN L23



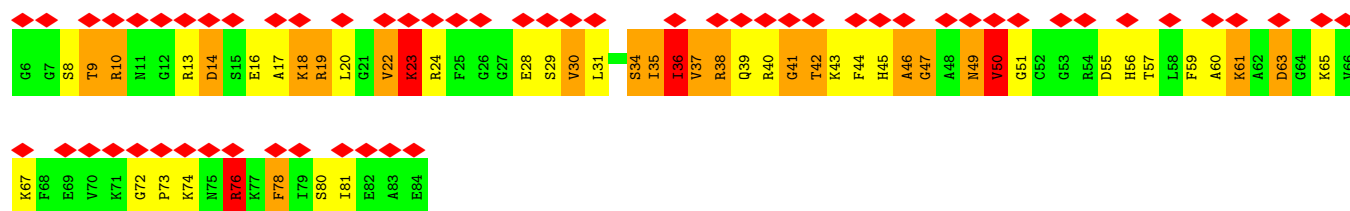
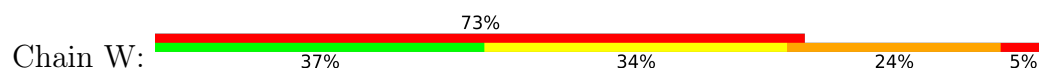
• Molecule 30: 50S RIBOSOMAL PROTEIN L24



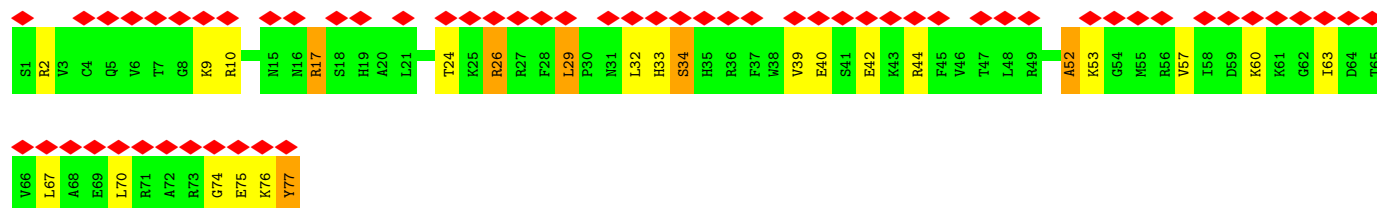
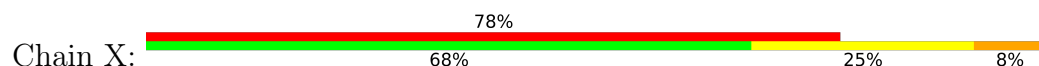
- Molecule 31: RNA



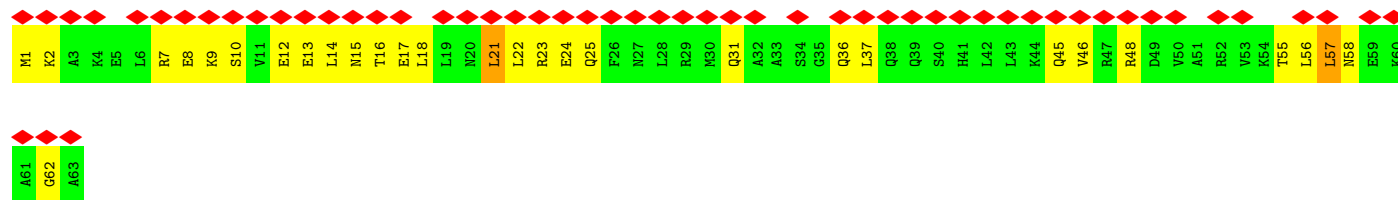
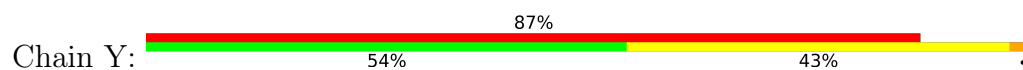
- Molecule 32: 50S RIBOSOMAL PROTEIN L27



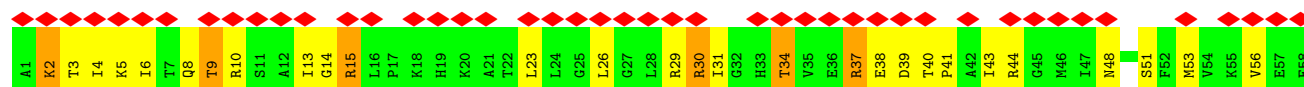
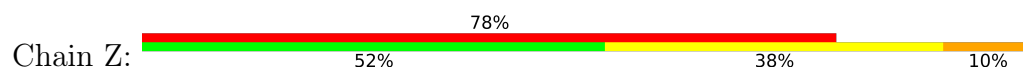
- Molecule 33: 50S RIBOSOMAL PROTEIN L28



- Molecule 34: 50S RIBOSOMAL PROTEIN L29



- Molecule 35: 50S RIBOSOMAL PROTEIN L30



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	72468	Depositor
Resolution determination method	Not provided	
CTF correction method	MICROGRAPH	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	Not provided	
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	FEI FALCON II (4k x 4k)	Depositor
Maximum map value	3.354	Depositor
Minimum map value	-2.711	Depositor
Average map value	-0.001	Depositor
Map value standard deviation	0.183	Depositor
Recommended contour level	0.9	Depositor
Map size ($\text{\AA}$)	404.80002, 404.80002, 404.80002	wwPDB
Map dimensions	368, 368, 368	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	1.1, 1.1, 1.1	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: 5MU, ZN, 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	0	0.69	0/450	0.89	0/599
2	1	0.68	0/416	1.02	2/554 (0.4%)
3	2	0.72	0/380	0.98	0/498
4	3	0.71	0/513	0.96	1/676 (0.1%)
5	4	0.86	1/303 (0.3%)	1.19	1/397 (0.3%)
6	5	0.90	0/1131	2.04	51/1524 (3.3%)
7	6	0.78	0/227	0.98	1/304 (0.3%)
8	7	0.91	0/175	3.11	10/237 (4.2%)
9	8	0.61	0/766	0.92	3/1025 (0.3%)
10	A	0.44	1/68626 (0.0%)	0.62	27/107056 (0.0%)
11	B	0.37	0/2828	0.55	0/4410
12	C	0.71	0/2121	1.10	8/2852 (0.3%)
13	D	0.74	0/1586	1.11	7/2134 (0.3%)
14	E	0.69	0/1571	1.00	3/2113 (0.1%)
15	F	0.60	0/1434	0.99	5/1926 (0.3%)
16	G	0.69	0/1343	0.99	1/1816 (0.1%)
17	H	0.69	0/389	1.05	1/523 (0.2%)
18	I	0.83	0/1046	1.23	14/1410 (1.0%)
19	J	0.81	1/1152 (0.1%)	1.07	3/1551 (0.2%)
20	K	0.83	0/947	1.02	1/1268 (0.1%)
21	L	0.74	0/1054	1.00	0/1403
22	M	0.79	0/1093	1.04	2/1460 (0.1%)
23	N	0.68	0/973	0.90	0/1301
24	O	0.59	0/902	0.96	1/1209 (0.1%)
25	P	0.67	0/929	1.03	2/1242 (0.2%)
26	Q	0.79	0/960	0.95	1/1278 (0.1%)
27	R	0.71	0/829	1.03	3/1107 (0.3%)
28	S	1.33	16/864 (1.9%)	1.43	10/1156 (0.9%)
29	T	0.73	0/744	1.11	3/994 (0.3%)
30	U	0.69	0/787	1.07	0/1051
31	V	1.39	12/1820 (0.7%)	1.46	31/2836 (1.1%)
32	W	0.94	2/603 (0.3%)	1.28	4/797 (0.5%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
33	X	0.66	0/635	0.98	1/848 (0.1%)
34	Y	0.55	0/510	0.97	0/677
35	Z	0.74	0/453	1.07	0/605
All	All	0.57	33/100560 (0.0%)	0.80	197/150837 (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
6	5	0	1
8	7	0	4
12	C	0	1
13	D	0	1
19	J	0	1
20	K	0	1
28	S	0	3
31	V	0	13
All	All	0	25

The worst 5 of 33 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
28	S	88	ARG	CA-C	-11.91	1.37	1.52
28	S	86	MET	CA-C	-10.74	1.39	1.52
10	A	2602	A	O3'-P	-8.04	1.49	1.61
28	S	94	ASP	C-O	-7.63	1.14	1.23
28	S	89	ALA	C-O	-7.42	1.14	1.23

The worst 5 of 197 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	7	23	ARG	O-C-N	23.05	147.82	121.32
10	A	2585	U	C4'-C3'-O3'	-19.93	83.11	113.00
10	A	2608	G	C4'-C3'-O3'	18.95	141.42	113.00
8	7	14	ASN	N-CA-CB	17.89	138.91	111.01
28	S	86	MET	C-N-CD	-17.20	54.48	125.00

There are no chirality outliers.

5 of 25 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
6	5	130	PRO	Peptide
8	7	15	ILE	Peptide
8	7	21	ASP	Peptide
8	7	23	ARG	Sidechain
8	7	6	ILE	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	0	444	0	461	20	0
2	1	409	0	440	15	0
3	2	377	0	418	13	0
4	3	504	0	574	10	0
5	4	302	0	340	17	0
6	5	1117	0	1155	133	0
7	6	227	0	237	7	0
8	7	170	0	166	96	0
9	8	753	0	780	17	0
10	A	61274	0	30816	845	0
11	B	2529	0	1281	20	0
12	C	2082	0	2157	54	0
13	D	1565	0	1616	51	0
14	E	1552	0	1619	46	0
15	F	1410	0	1445	46	0
16	G	1323	0	1374	43	0
17	H	384	0	405	15	0
18	I	1032	0	1088	57	0
19	J	1129	0	1162	60	0
20	K	938	0	1012	40	0
21	L	1045	0	1117	40	0
22	M	1074	0	1157	33	0
23	N	960	0	1000	30	0
24	O	892	0	923	22	0
25	P	917	0	965	41	0
26	Q	947	0	1022	55	0
27	R	816	0	839	35	0
28	S	857	0	922	55	0
29	T	738	0	807	40	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
30	U	779	0	834	29	0
31	V	1649	0	832	49	0
32	W	596	0	610	83	0
33	X	625	0	655	17	0
34	Y	509	0	543	17	0
35	Z	449	0	491	19	0
36	4	1	0	0	0	0
36	A	135	0	0	0	0
36	B	4	0	0	0	0
36	C	2	0	0	0	0
36	E	1	0	0	0	0
37	4	1	0	0	0	0
38	7	30	8	18	24	0
39	A	416	0	0	78	0
39	B	14	0	0	1	0
39	C	2	0	0	0	0
39	D	3	0	0	0	0
39	E	2	0	0	0	0
39	L	2	0	0	0	0
All	All	92987	8	61281	1877	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 12.

The worst 5 of 1877 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)
8:7:11:LYS:CE	28:S:91:GLY:HA3	1.51	1.40
8:7:7:CYS:SG	28:S:95:ARG:NH2	2.05	1.29
15:F:79:ARG:NH2	31:V:56:C:O2	1.62	1.27
8:7:14:ASN:O	8:7:15:ILE:HD13	1.35	1.25
10:A:1923:U:H5''	31:V:24:G:O2'	1.04	1.19

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 PDB entries followed by that with respect to all EM entries.

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	0	54/56 (96%)	43 (80%)	7 (13%)	4 (7%)	1	11
2	1	48/50 (96%)	42 (88%)	3 (6%)	3 (6%)	1	14
3	2	44/46 (96%)	41 (93%)	3 (7%)	0	100	100
4	3	62/64 (97%)	53 (86%)	7 (11%)	2 (3%)	3	24
5	4	36/38 (95%)	29 (81%)	4 (11%)	3 (8%)	0	9
6	5	146/148 (99%)	77 (53%)	41 (28%)	28 (19%)	0	1
7	6	28/30 (93%)	20 (71%)	7 (25%)	1 (4%)	2	22
8	7	18/20 (90%)	7 (39%)	1 (6%)	10 (56%)	0	0
9	8	92/94 (98%)	81 (88%)	11 (12%)	0	100	100
12	C	269/271 (99%)	211 (78%)	43 (16%)	15 (6%)	1	15
13	D	207/209 (99%)	163 (79%)	30 (14%)	14 (7%)	1	12
14	E	199/201 (99%)	162 (81%)	27 (14%)	10 (5%)	1	17
15	F	175/177 (99%)	141 (81%)	30 (17%)	4 (2%)	5	30
16	G	174/176 (99%)	127 (73%)	30 (17%)	17 (10%)	0	7
17	H	48/50 (96%)	29 (60%)	14 (29%)	5 (10%)	0	6
18	I	139/141 (99%)	97 (70%)	33 (24%)	9 (6%)	1	14
19	J	140/142 (99%)	113 (81%)	18 (13%)	9 (6%)	1	14
20	K	120/122 (98%)	95 (79%)	15 (12%)	10 (8%)	0	9
21	L	141/143 (99%)	104 (74%)	32 (23%)	5 (4%)	3	23
22	M	134/136 (98%)	107 (80%)	16 (12%)	11 (8%)	0	10
23	N	118/120 (98%)	101 (86%)	16 (14%)	1 (1%)	16	48
24	O	114/116 (98%)	95 (83%)	18 (16%)	1 (1%)	14	45
25	P	112/114 (98%)	86 (77%)	17 (15%)	9 (8%)	1	10
26	Q	115/117 (98%)	99 (86%)	12 (10%)	4 (4%)	3	23
27	R	101/103 (98%)	83 (82%)	15 (15%)	3 (3%)	3	25

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
28	S	108/110 (98%)	90 (83%)	10 (9%)	8 (7%)	1	11
29	T	91/93 (98%)	57 (63%)	24 (26%)	10 (11%)	0	5
30	U	100/102 (98%)	74 (74%)	16 (16%)	10 (10%)	0	7
32	W	77/79 (98%)	39 (51%)	21 (27%)	17 (22%)	0	1
33	X	75/77 (97%)	64 (85%)	8 (11%)	3 (4%)	2	20
34	Y	61/63 (97%)	39 (64%)	18 (30%)	4 (7%)	1	13
35	Z	56/58 (97%)	46 (82%)	8 (14%)	2 (4%)	2	22
All	All	3402/3466 (98%)	2615 (77%)	555 (16%)	232 (7%)	2	12

5 of 232 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	0	23	ALA
4	3	22	LYS
5	4	8	LYS
6	5	27	VAL
6	5	48	ALA

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 PDB entries followed by that with respect to all EM entries.

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	0	47/47 (100%)	46 (98%)	1 (2%)	47	64
2	1	45/45 (100%)	42 (93%)	3 (7%)	15	41
3	2	38/38 (100%)	35 (92%)	3 (8%)	11	36
4	3	51/51 (100%)	45 (88%)	6 (12%)	5	22
5	4	34/34 (100%)	29 (85%)	5 (15%)	3	17
6	5	112/112 (100%)	93 (83%)	19 (17%)	2	13
7	6	26/26 (100%)	21 (81%)	5 (19%)	1	9
8	7	20/20 (100%)	12 (60%)	8 (40%)	0	0
9	8	78/78 (100%)	73 (94%)	5 (6%)	16	42

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
12	C	216/216 (100%)	199 (92%)	17 (8%)	11	36
13	D	164/164 (100%)	143 (87%)	21 (13%)	4	21
14	E	165/165 (100%)	146 (88%)	19 (12%)	5	23
15	F	148/148 (100%)	135 (91%)	13 (9%)	9	33
16	G	137/137 (100%)	122 (89%)	15 (11%)	6	25
17	H	40/40 (100%)	38 (95%)	2 (5%)	22	47
18	I	109/109 (100%)	106 (97%)	3 (3%)	38	58
19	J	116/116 (100%)	97 (84%)	19 (16%)	2	14
20	K	103/103 (100%)	88 (85%)	15 (15%)	3	17
21	L	102/102 (100%)	89 (87%)	13 (13%)	4	21
22	M	109/109 (100%)	93 (85%)	16 (15%)	3	17
23	N	100/100 (100%)	90 (90%)	10 (10%)	7	28
24	O	86/86 (100%)	78 (91%)	8 (9%)	8	30
25	P	99/99 (100%)	86 (87%)	13 (13%)	4	20
26	Q	89/89 (100%)	80 (90%)	9 (10%)	7	27
27	R	84/84 (100%)	74 (88%)	10 (12%)	5	22
28	S	93/93 (100%)	81 (87%)	12 (13%)	4	20
29	T	80/80 (100%)	75 (94%)	5 (6%)	16	42
30	U	83/83 (100%)	75 (90%)	8 (10%)	8	29
32	W	59/59 (100%)	50 (85%)	9 (15%)	3	16
33	X	67/67 (100%)	59 (88%)	8 (12%)	5	22
34	Y	55/55 (100%)	51 (93%)	4 (7%)	13	39
35	Z	48/48 (100%)	39 (81%)	9 (19%)	1	10
All	All	2803/2803 (100%)	2490 (89%)	313 (11%)	8	24

5 of 313 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
25	P	69	VAL
32	W	30	VAL
25	P	103	THR
28	S	33	LEU
34	Y	10	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 25 such sidechains are listed below:

Mol	Chain	Res	Type
17	H	33	GLN
20	K	93	GLN
34	Y	41	HIS
20	K	5	GLN
22	M	22	GLN

5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
10	A	2850/2854 (99%)	455 (15%)	40 (1%)
11	B	117/118 (99%)	17 (14%)	0
31	V	76/77 (98%)	15 (19%)	0
All	All	3043/3049 (99%)	487 (16%)	40 (1%)

5 of 487 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
10	A	10	A
10	A	12	U
10	A	15	G
10	A	34	U
10	A	35	G

5 of 40 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
10	A	1847	A
10	A	2326	C
10	A	1870	C
10	A	2142	A
10	A	2756	U

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

1 non-standard protein/DNA/RNA residue is 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
31	5MU	V	54	31	18,21,23	0.64	0	25,30,35	0.75	1 (4%)

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
31	5MU	V	54	31	-	0/7/25/26	0/2/2/2

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
31	V	54	5MU	O4'-C1'-N1	2.45	113.91	108.36

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 146 ligands modelled in this entry, 144 are monoatomic - leaving 2 for Mogul analysis.

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	$\# Z > 2$
38	TRP	7	1001	-	15,16,16	0.69	1 (6%)	18,22,22	0.75	1 (5%)
38	TRP	7	1002	-	15,16,16	0.71	1 (6%)	18,22,22	0.75	1 (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
38	TRP	7	1001	-	-	0/8/8/8	0/2/2/2
38	TRP	7	1002	-	-	4/8/8/8	0/2/2/2

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
38	7	1002	TRP	OXT-C	-2.22	1.23	1.30
38	7	1001	TRP	OXT-C	-2.20	1.23	1.30

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
38	7	1001	TRP	OXT-C-O	-2.72	117.91	124.08
38	7	1002	TRP	OXT-C-O	-2.65	118.07	124.08

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
38	7	1002	TRP	N-CA-CB-CG
38	7	1002	TRP	OXT-C-CA-CB
38	7	1002	TRP	CA-CB-CG-CD2
38	7	1002	TRP	O-C-CA-CB

There are no ring outliers.

2 monomers are involved in 24 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
38	7	1001	TRP	8	0
38	7	1002	TRP	16	0

5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
10	A	3

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	A	2157:G	O3'	2179:C	P	44.42
1	A	2110:G	O3'	2133:G	P	30.78
1	A	885:C	O3'	892:A	P	11.37

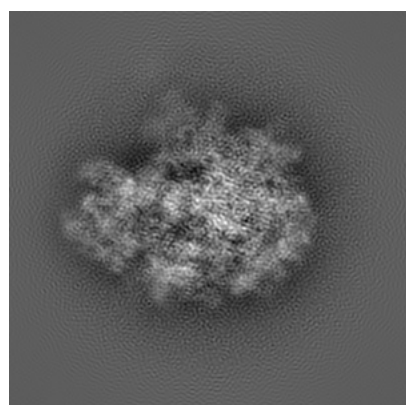
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-2773. These allow visual inspection of the internal detail of the map and identification of artifacts.

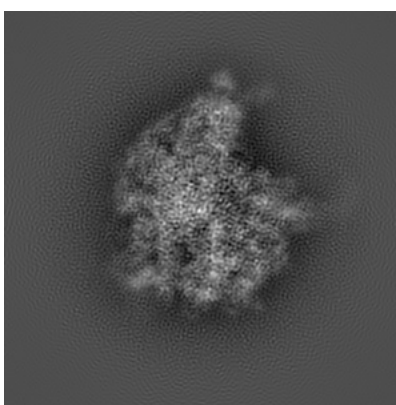
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

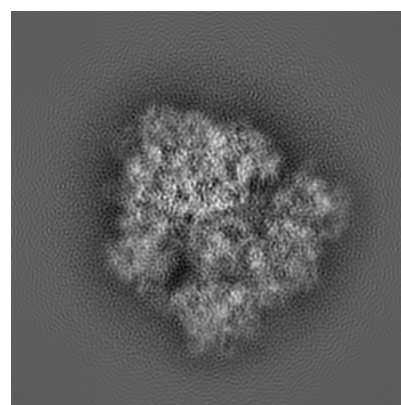
6.1.1 Primary map



X



Y

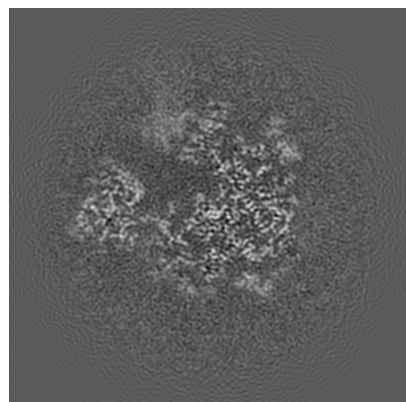


Z

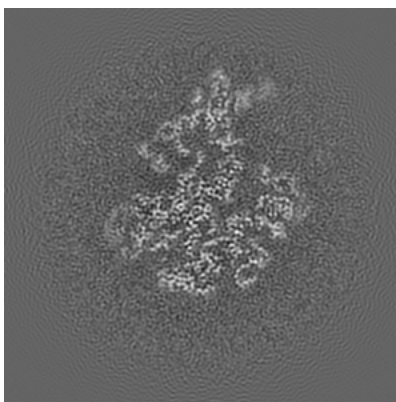
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

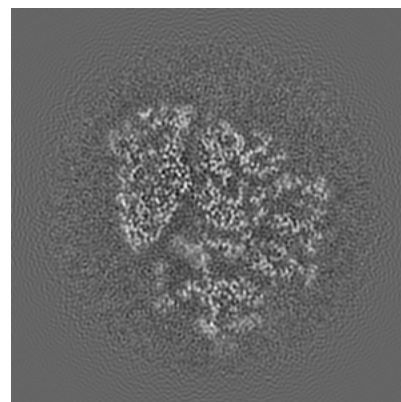
6.2.1 Primary map



X Index: 184



Y Index: 184

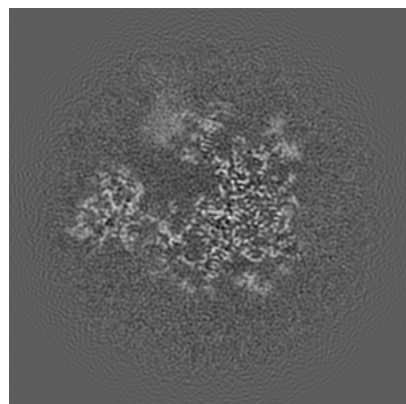


Z Index: 184

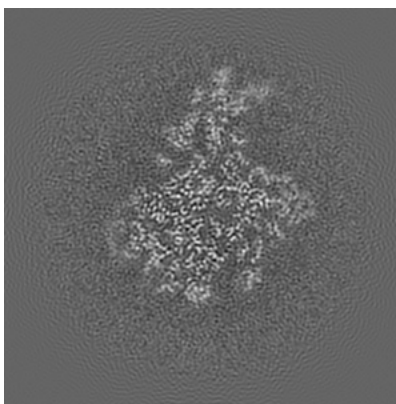
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

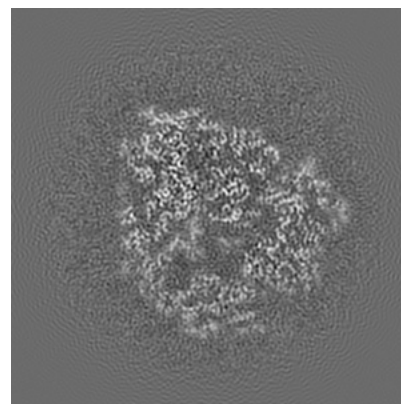
6.3.1 Primary map



X Index: 183



Y Index: 190

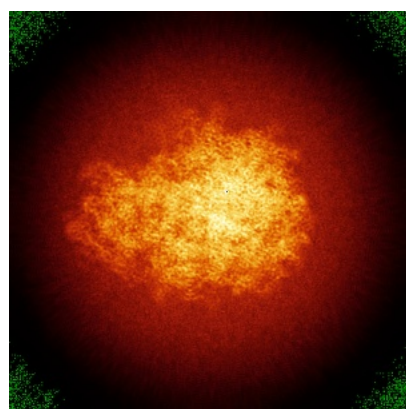


Z Index: 192

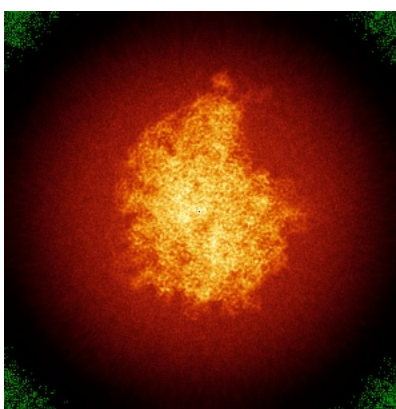
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) [i](#)

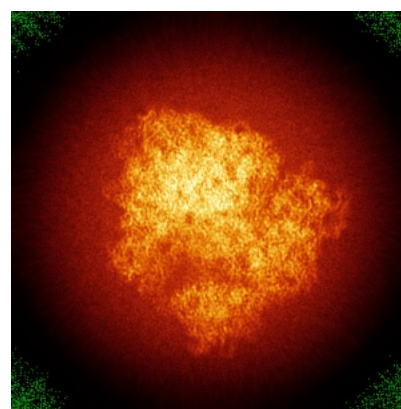
6.4.1 Primary map



X



Y

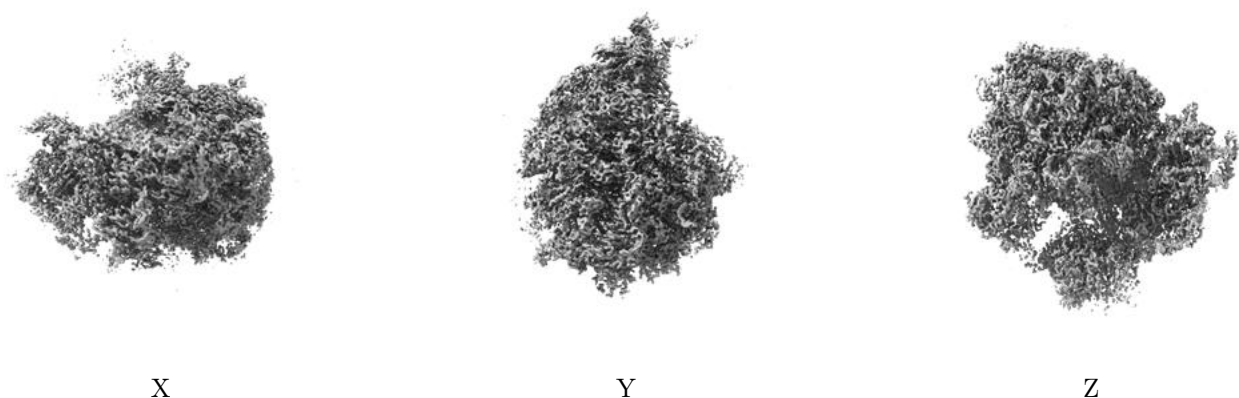


Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.9. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

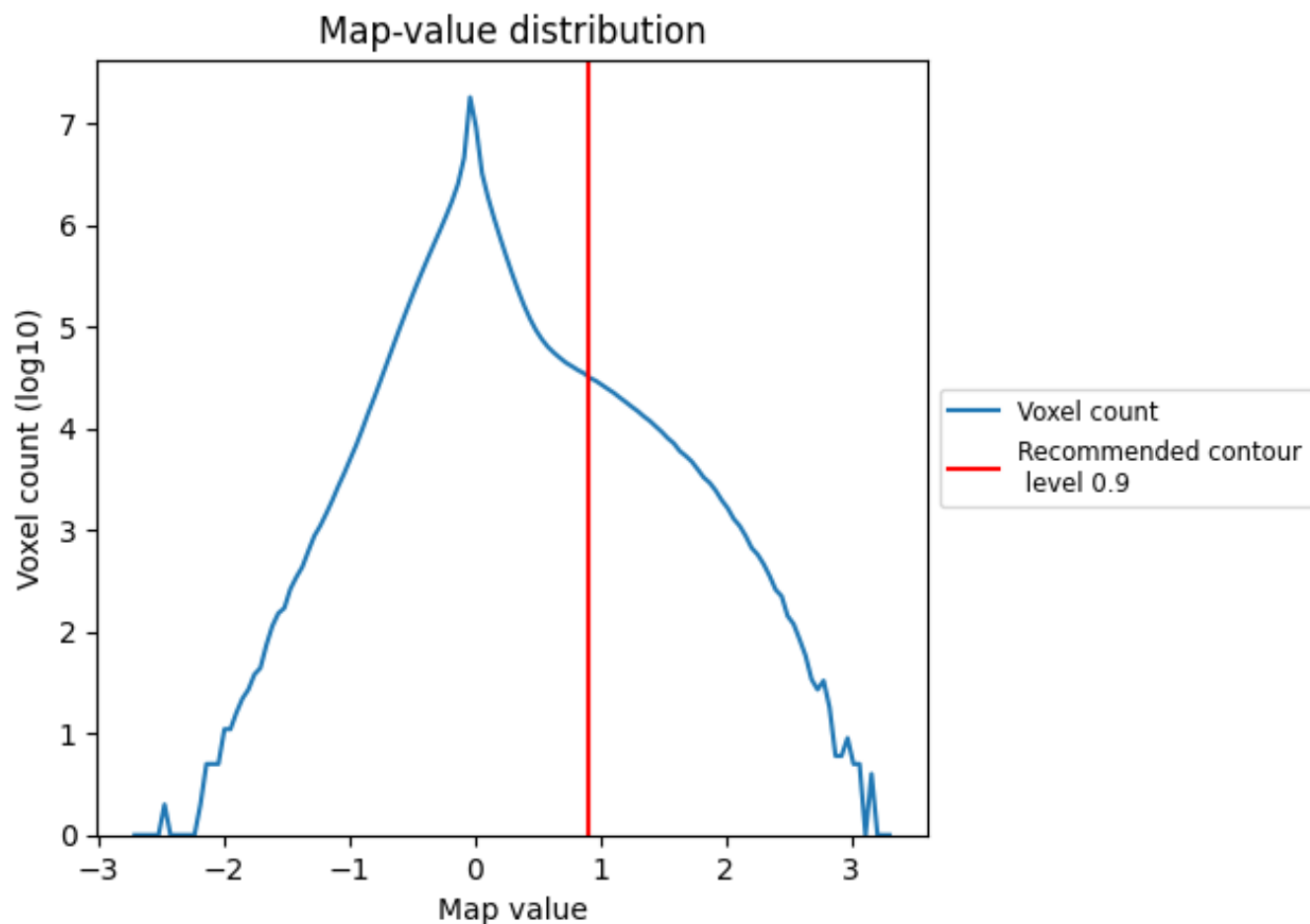
6.6 Mask visualisation [i](#)

This section was not generated. No masks/segmentation were deposited.

7 Map analysis [i](#)

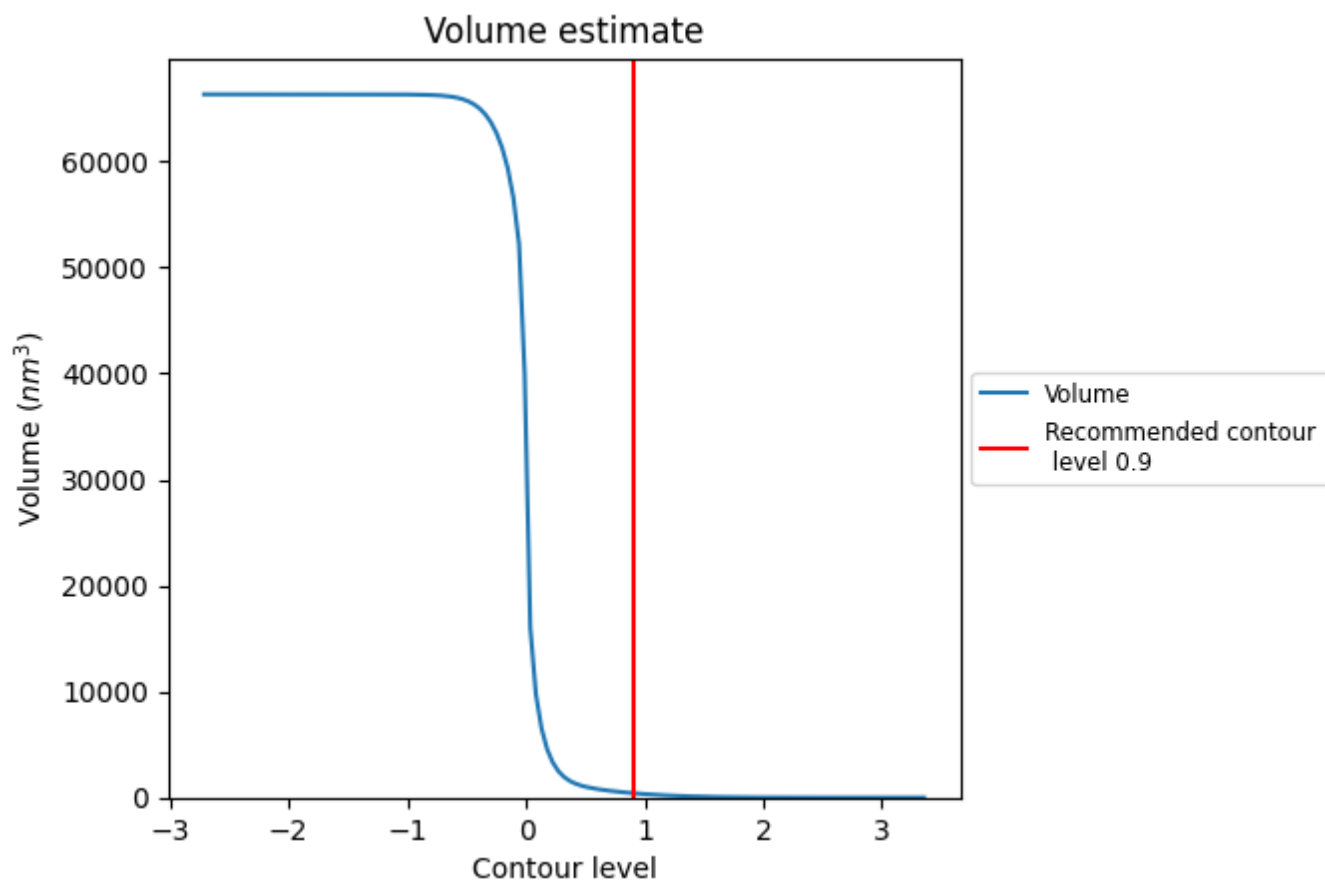
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

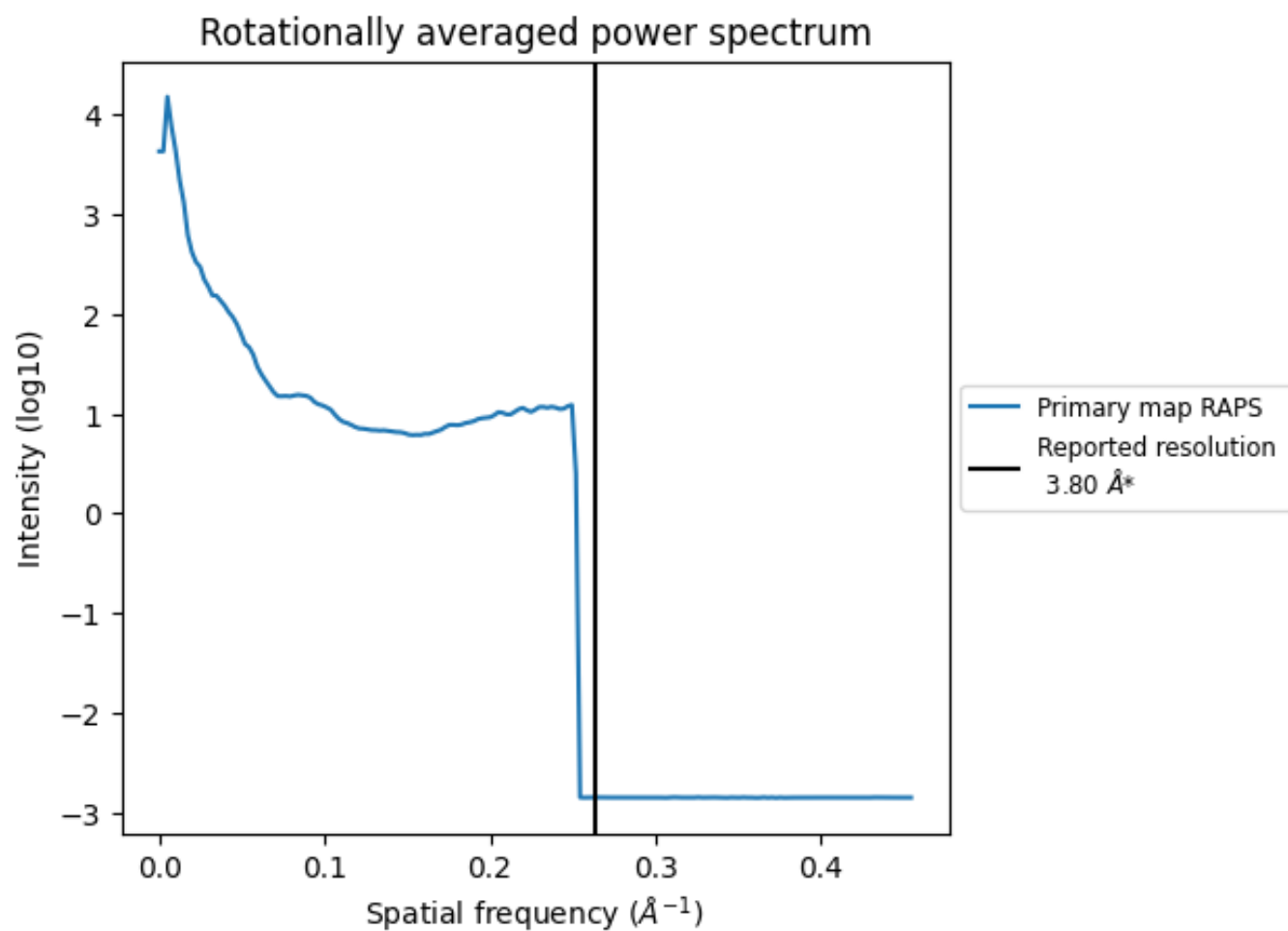
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 416 nm^3 ; this corresponds to an approximate mass of 376 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum ⓘ



*Reported resolution corresponds to spatial frequency of 0.263 Å⁻¹

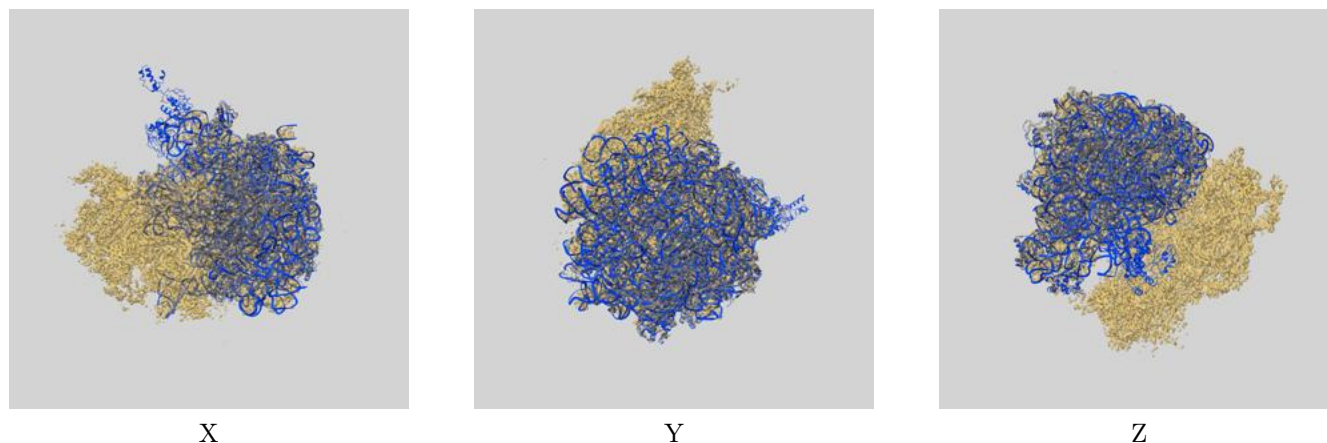
8 Fourier-Shell correlation

This section was not generated. No FSC curve or half-maps provided.

9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-2773 and PDB model 4UY8. Per-residue inclusion information can be found in [section 3](#) on [page 12](#).

9.1 Map-model overlay [i](#)



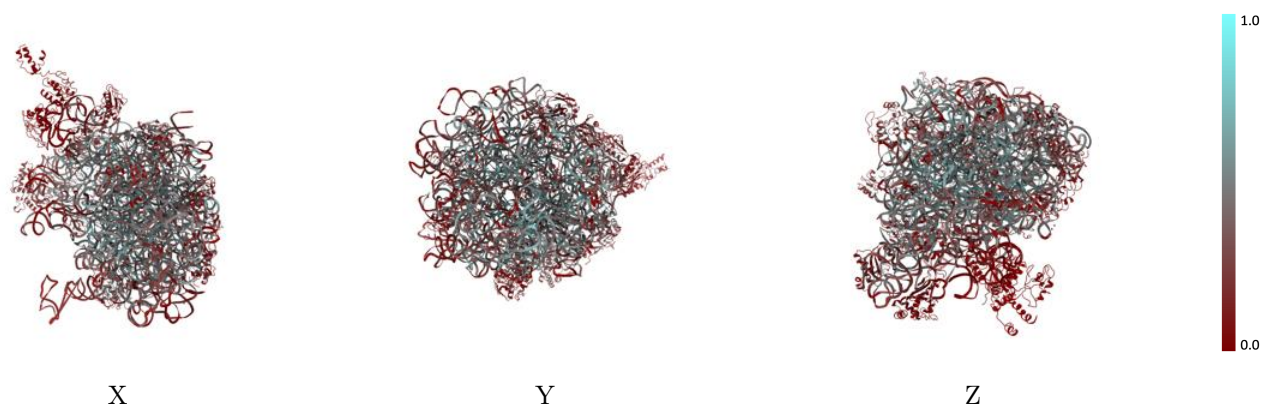
The images above show the 3D surface view of the map at the recommended contour level 0.9 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model [i](#)



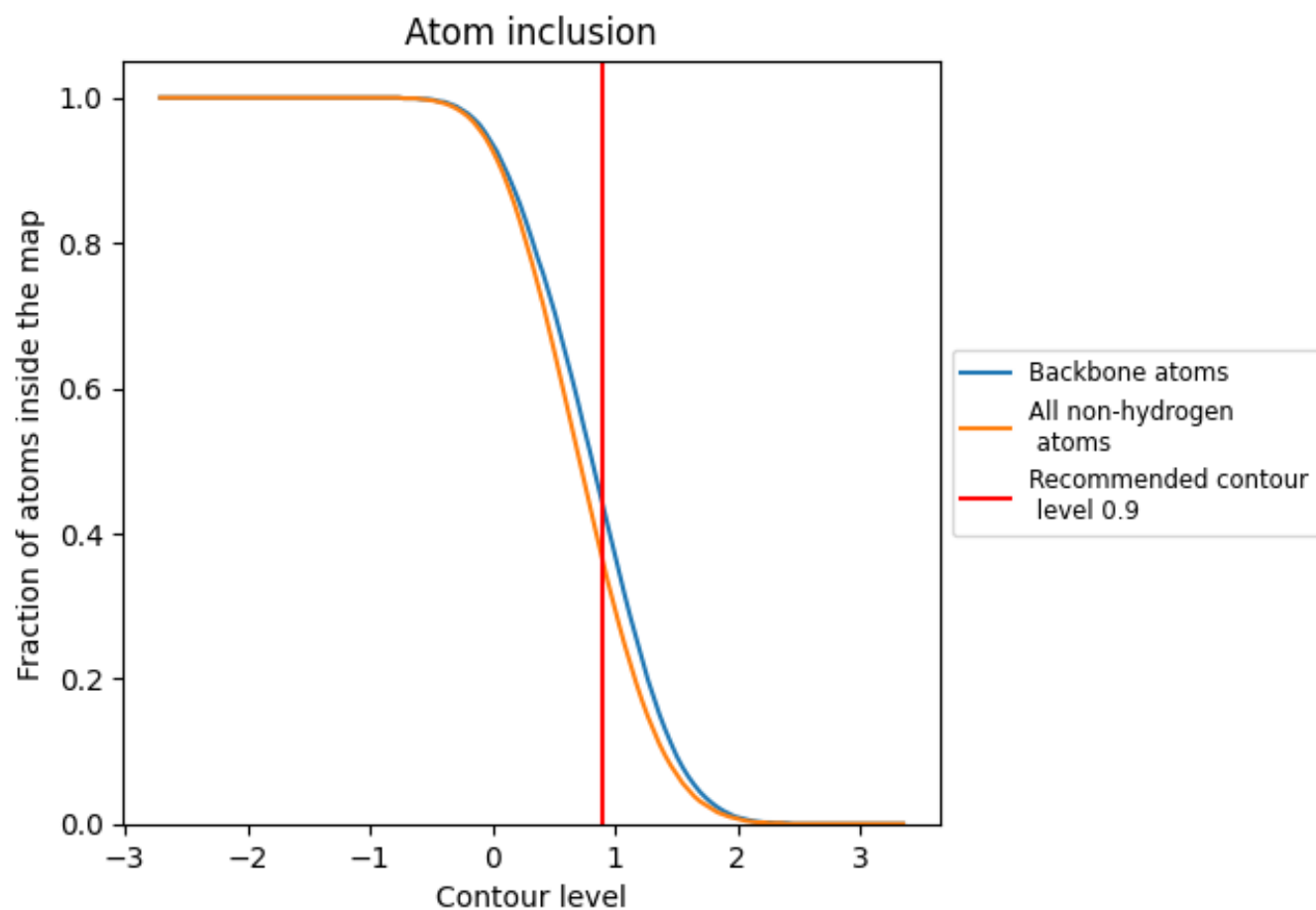
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

9.3 Atom inclusion mapped to coordinate model [i](#)



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.9).

9.4 Atom inclusion [i](#)



At the recommended contour level, 44% of all backbone atoms, 36% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (0.9) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.3630	0.2860
0	0.2830	0.3180
1	0.0970	0.2320
2	0.3550	0.3680
3	0.2440	0.3350
4	0.3060	0.3400
5	0.0020	0.0150
6	0.0000	0.0280
7	0.0100	0.4110
8	0.1990	0.2970
A	0.4360	0.3060
B	0.3430	0.2070
C	0.3020	0.3600
D	0.2570	0.3000
E	0.2080	0.2730
F	0.0640	-0.0250
G	0.1050	0.2230
H	0.1290	0.2250
I	0.0030	0.0570
J	0.3410	0.3360
K	0.2460	0.2790
L	0.1970	0.2570
M	0.2840	0.3370
N	0.2830	0.2800
O	0.1700	0.1830
P	0.1850	0.2070
Q	0.3870	0.3430
R	0.2750	0.3380
S	0.3160	0.3620
T	0.2040	0.2620
U	0.1680	0.2830
V	0.1660	0.1640
W	0.2660	0.2670
X	0.2480	0.3210
Y	0.1790	0.2650
Z	0.2680	0.3130

