



Full wwPDB EM Validation Report ⓘ

Dec 11, 2022 – 07:03 am GMT

PDB ID : 4D61
EMDB ID : EMD-2813
Title : Cryo-EM structures of ribosomal 80S complexes with termination factors and cricket paralysis virus IRES reveal the IRES in the translocated state
Authors : Muhs, M.; Hilal, T.; Mielke, T.; Skabkin, M.A.; Sanbonmatsu, K.Y.; Pestova, T.V.; Spahn, C.M.T.
Deposited on : 2014-11-07
Resolution : 9.00 Å(reported)

This is a Full wwPDB EM Validation 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.dev43
MolProbity : 4.02b-467
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.31.3

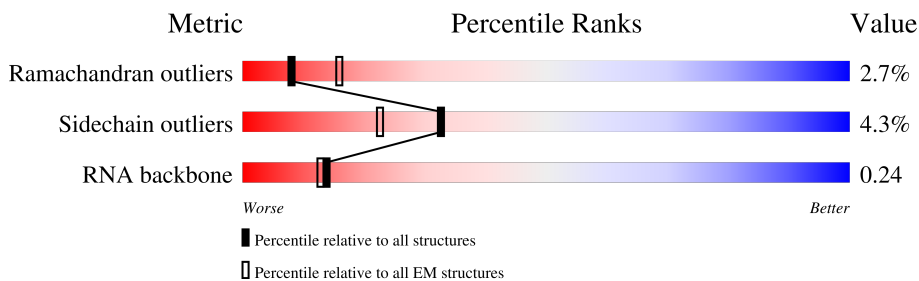
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 9.00 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)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

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	1	1869	
2	A	295	
3	B	264	
4	C	293	
5	D	243	
6	E	263	
7	F	204	
8	G	249	

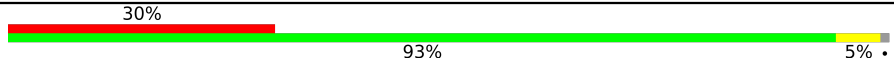
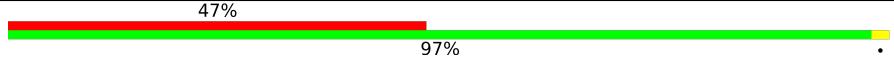
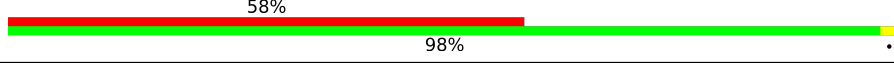

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Mol	Chain	Length	Quality of chain
9	H	194	54% 94% ...
10	I	208	22% 91% 8%
11	J	194	9% 86% 7% 8%
12	K	165	12% 52% 5% 43%
13	L	158	26% 87% 5% 8%
14	M	132	54% 83% 7% 9%
15	N	151	17% 95% ...
16	O	151	17% 85% 5% 9%
17	P	145	23% 75% 6% 19%
18	Q	146	17% 91% 5%
19	R	135	29% 76% 5% 19%
20	S	152	18% 82% 11% 7%
21	T	145	26% 92% 6%
22	U	119	29% 81% 15%
23	V	83	43% 96% .
24	W	130	21% 94% 5% .
25	X	143	14% 85% 8% 6%
26	Y	133	17% 84% 8% 8%
27	Z	125	11% 55% 6% 39%
28	a	115	20% 74% 9% 17%
29	b	84	25% 90% 5% 5%
30	c	69	26% 83% 7% 10%
31	d	56	9% 88% 7% 5%
32	e	59	32% 81% 5% 14%
33	f	156	24% 37% 61%

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Mol	Chain	Length	Quality of chain
34	g	317	
35	h	436	
36	i	426	
37	j	201	

2 Entry composition [i](#)

There are 37 unique types of molecules in this entry. The entry contains 86384 atoms, of which 0 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 RNA chain called 18S RRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	1	1742	37159	16589	6665	12164	1741	0	0

- Molecule 2 is a protein called 40S RIBOSOMAL PROTEIN SA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	A	218	1719	1091	301	319	8	0	0

- Molecule 3 is a protein called 40S RIBOSOMAL PROTEIN S3A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	B	213	1729	1098	309	308	14	0	0

- Molecule 4 is a protein called 40S RIBOSOMAL PROTEIN S2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	C	222	1724	1114	296	304	10	0	0

- Molecule 5 is a protein called 40S RIBOSOMAL PROTEIN S3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	D	212	1646	1050	299	290	7	0	0

- Molecule 6 is a protein called 40S RIBOSOMAL PROTEIN S4, Y ISOFORM 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	E	257	2031	1298	381	344	8	0	0

- Molecule 7 is a protein called 40S RIBOSOMAL PROTEIN S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	F	188	Total	C	N	O	S	0	0
			1486	930	283	266	7		

- Molecule 8 is a protein called 40S RIBOSOMAL PROTEIN S6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	G	232	Total	C	N	O	S	0	0
			1884	1176	379	322	7		

- Molecule 9 is a protein called 40S RIBOSOMAL PROTEIN S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	H	191	Total	C	N	O	S	0	0
			1535	978	282	274	1		

- Molecule 10 is a protein called 40S RIBOSOMAL PROTEIN S8.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	I	207	Total	C	N	O	S	0	0
			1695	1064	334	292	5		

- Molecule 11 is a protein called 40S RIBOSOMAL PROTEIN S9.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	J	179	Total	C	N	O	S	0	0
			1495	953	299	241	2		

- Molecule 12 is a protein called 40S RIBOSOMAL PROTEIN S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	K	94	Total	C	N	O	S	0	0
			791	519	138	129	5		

- Molecule 13 is a protein called 40S RIBOSOMAL PROTEIN S11.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	L	146	Total	C	N	O	S	0	0
			1199	764	224	205	6		

- Molecule 14 is a protein called 40S RIBOSOMAL PROTEIN S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
14	M	120	931	584	164	174	9	0	0

- Molecule 15 is a protein called 40S RIBOSOMAL PROTEIN S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
15	N	150	1207	773	229	204	1	0	0

- Molecule 16 is a protein called 40S RIBOSOMAL PROTEIN S14.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
16	O	137	1023	627	200	190	6	0	0

- Molecule 17 is a protein called 40S RIBOSOMAL PROTEIN S15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
17	P	118	981	625	183	166	7	0	0

- Molecule 18 is a protein called 40S RIBOSOMAL PROTEIN S16.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
18	Q	139	1108	704	210	191	3	0	0

- Molecule 19 is a protein called 40S RIBOSOMAL PROTEIN S17.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
19	R	109	893	561	170	159	3	0	0

- Molecule 20 is a protein called 40S RIBOSOMAL PROTEIN S18.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
20	S	142	1172	736	236	199	1	0	0

- Molecule 21 is a protein called 40S RIBOSOMAL PROTEIN S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
21	T	143	1112	697	214	198	3	0	0

- Molecule 22 is a protein called 40S RIBOSOMAL PROTEIN S20.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
22	U	101	803	502	153	144	4	0	0

- Molecule 23 is a protein called 40S RIBOSOMAL PROTEIN S21.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
23	V	83	636	393	117	121	5	0	0

- Molecule 24 is a protein called 40S RIBOSOMAL PROTEIN S15A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
24	W	129	1033	659	193	175	6	0	0

- Molecule 25 is a protein called 40S RIBOSOMAL PROTEIN S23.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
25	X	134	1046	663	205	176	2	0	0

- Molecule 26 is a protein called 40S RIBOSOMAL PROTEIN S24.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
26	Y	122	1002	635	196	166	5	0	0

- Molecule 27 is a protein called 40S RIBOSOMAL PROTEIN S25.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
27	Z	76	605	387	112	105	1	0	0

- Molecule 28 is a protein called 40S RIBOSOMAL PROTEIN S26.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
28	a	96	767	476	159	127	5	0	0

- Molecule 29 is a protein called 40S RIBOSOMAL PROTEIN S27.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
29	b	80	625	391	116	111	7	0	0

- Molecule 30 is a protein called 40S RIBOSOMAL PROTEIN S28.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
30	c	62	490	298	99	91	2	0	0

- Molecule 31 is a protein called 40S RIBOSOMAL PROTEIN S29.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
31	d	53	444	278	90	71	5	0	0

- Molecule 32 is a protein called 40S RIBOSOMAL PROTEIN S30.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
32	e	51	412	258	90	63	1	0	0

- Molecule 33 is a protein called UBIQUITIN-40S RIBOSOMAL PROTEIN S27A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
33	f	61	497	312	94	84	7	0	0

- Molecule 34 is a protein called GUANINE NUCLEOTIDE-BINDING PROTEIN SUBUNIT BETA-2-LIKE 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
34	g	314	2440	1537	425	466	12	0	0

- Molecule 35 is a protein called EUKARYOTIC PEPTIDE CHAIN RELEASE FACTOR SUBUNIT 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
35	h	436	3450	2193	582	663	12	0	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
h	438	LEU	-	expression tag	UNP P62495
h	439	GLU	-	expression tag	UNP P62495
h	440	HIS	-	expression tag	UNP P62495

- Molecule 36 is a protein called EUKARYOTIC PEPTIDE CHAIN RELEASE FACTOR GTP-BINDING SUBUNIT ERF3A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
36	i	426	3357	2135	577	624	21	0	0

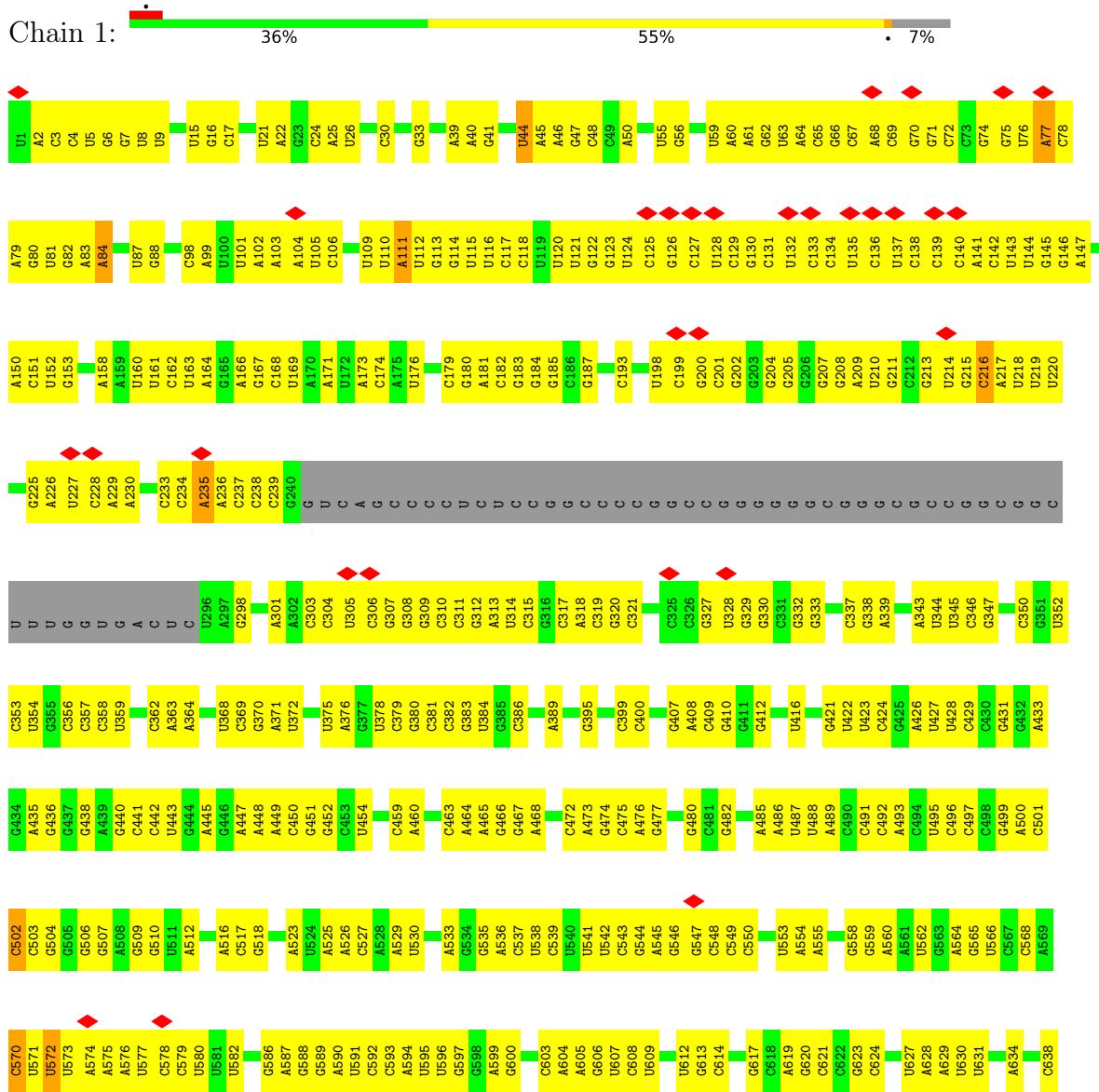
- Molecule 37 is a RNA chain called CRICKET PARALYSIS VIRUS IRES RNA.

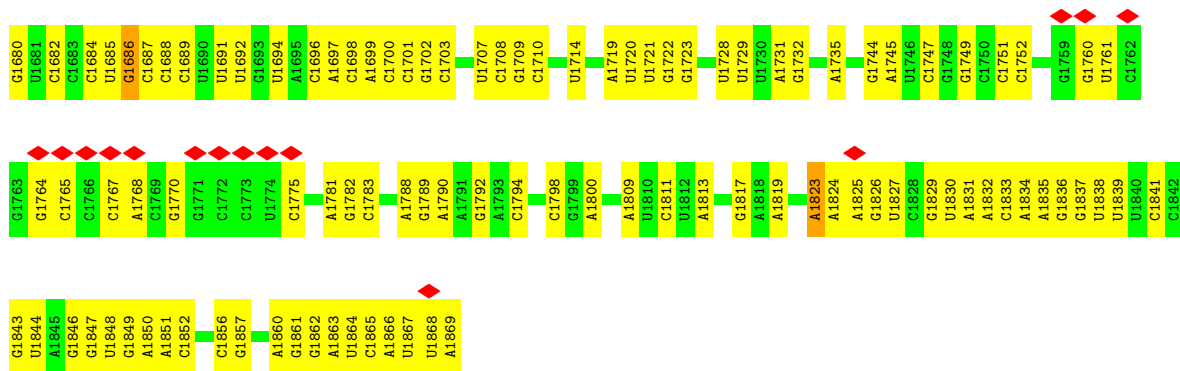
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
37	j	201	4257	1908	735	1413	201	0	0

3 Residue-property plots [i](#)

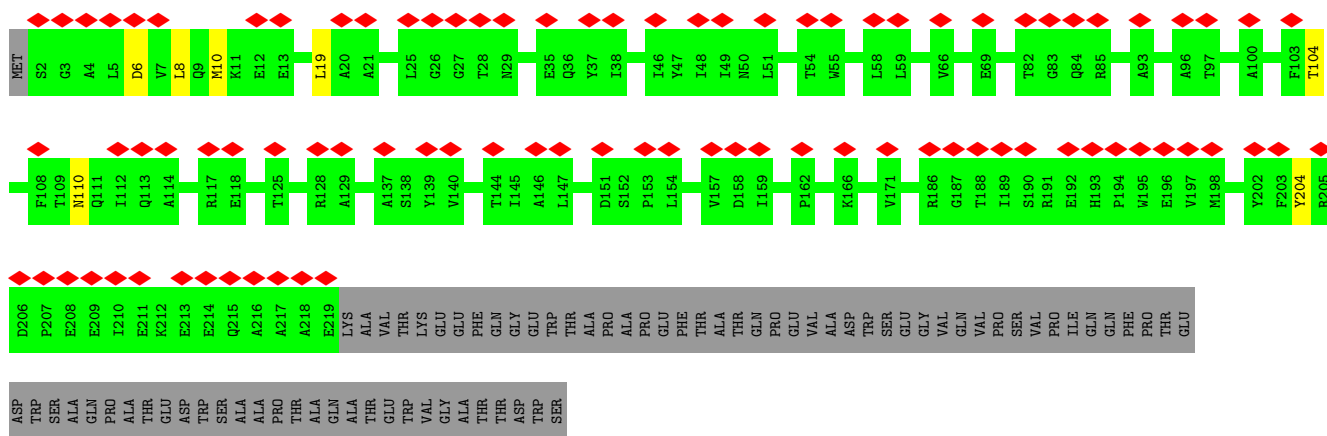
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: 18S RRNA

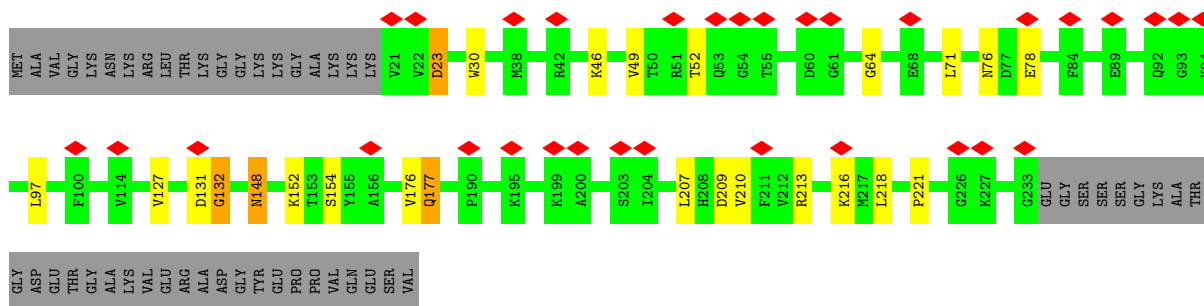




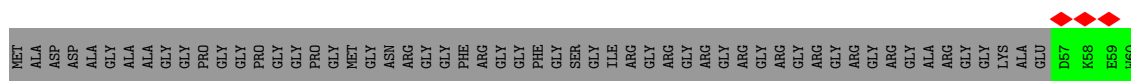
• Molecule 2: 40S RIBOSOMAL PROTEIN SA

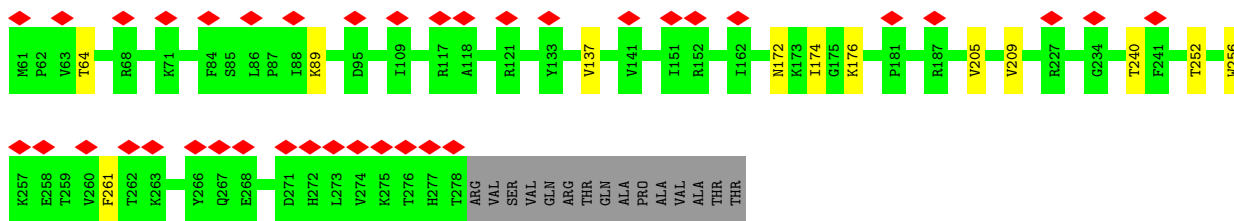


• Molecule 3: 40S RIBOSOMAL PROTEIN S3A

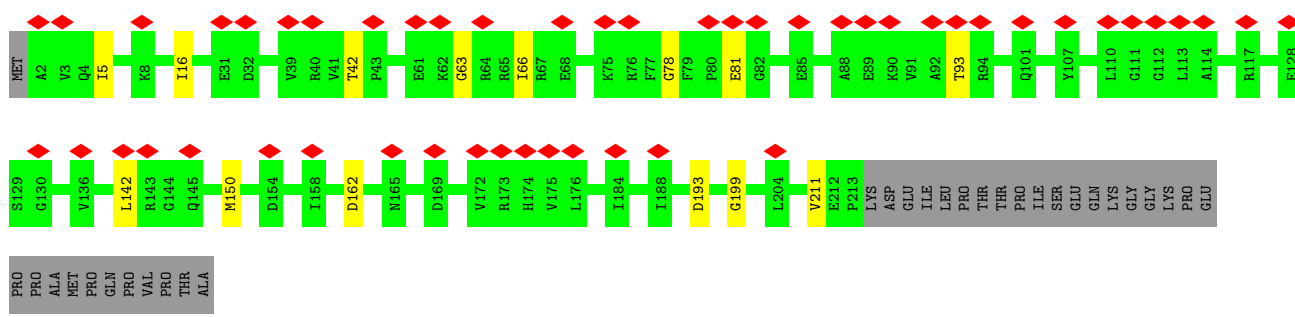
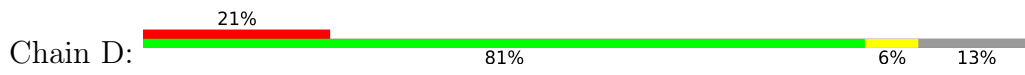


• Molecule 4: 40S RIBOSOMAL PROTEIN S2

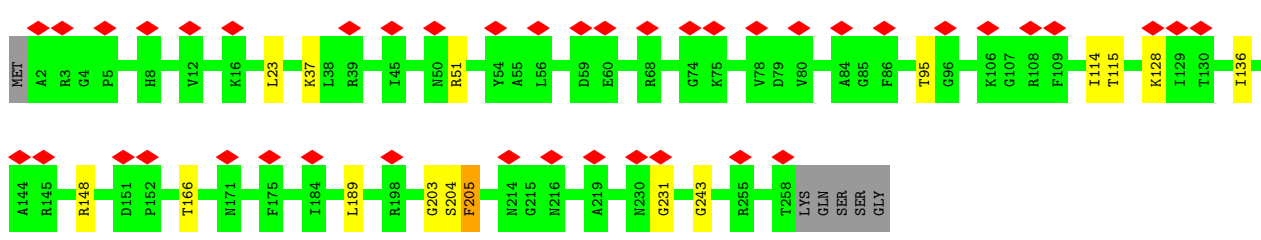
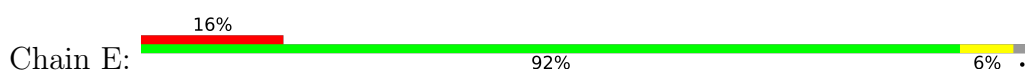




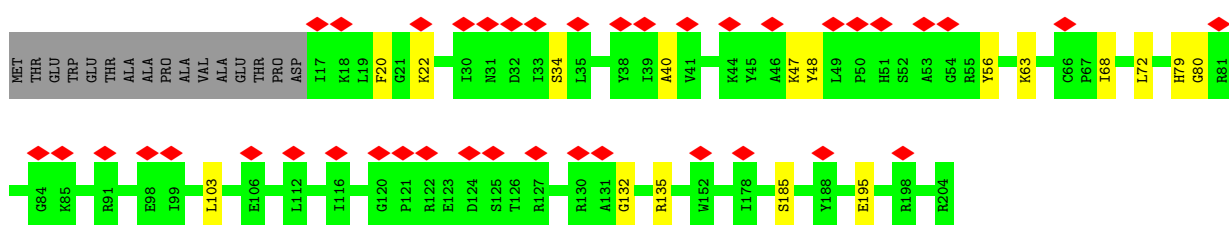
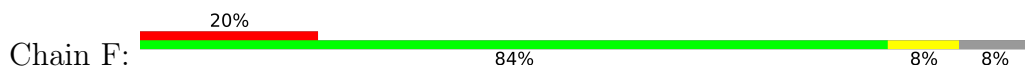
• Molecule 5: 40S RIBOSOMAL PROTEIN S3



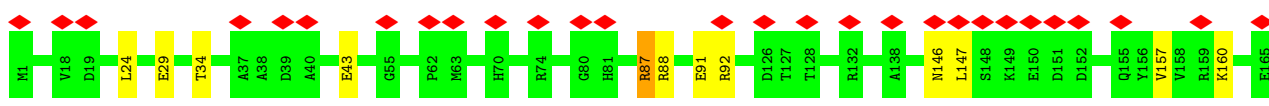
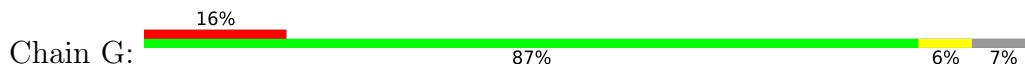
• Molecule 6: 40S RIBOSOMAL PROTEIN S4, Y ISOFORM 1

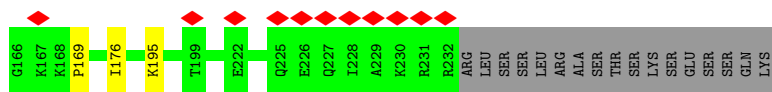


• Molecule 7: 40S RIBOSOMAL PROTEIN S5

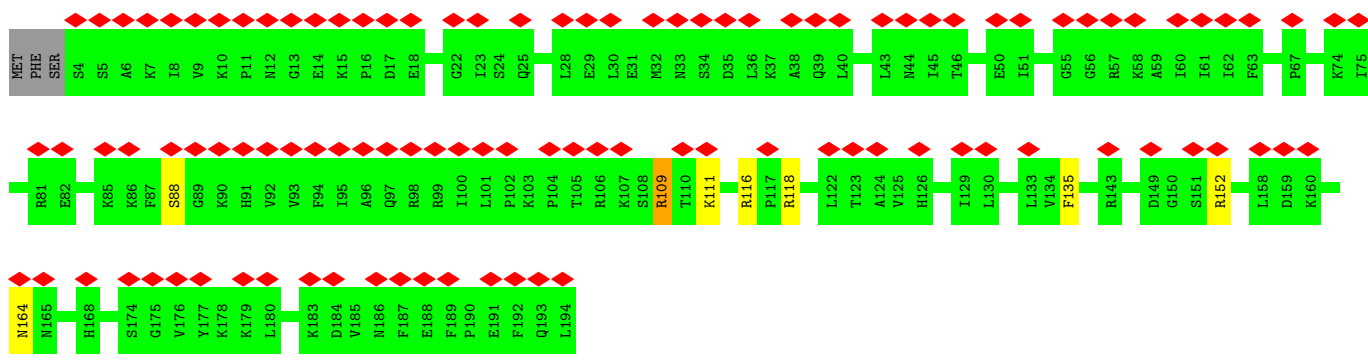
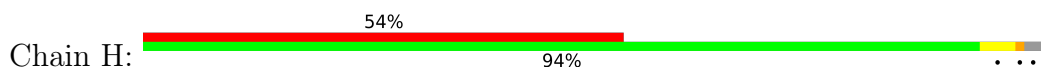


• Molecule 8: 40S RIBOSOMAL PROTEIN S6

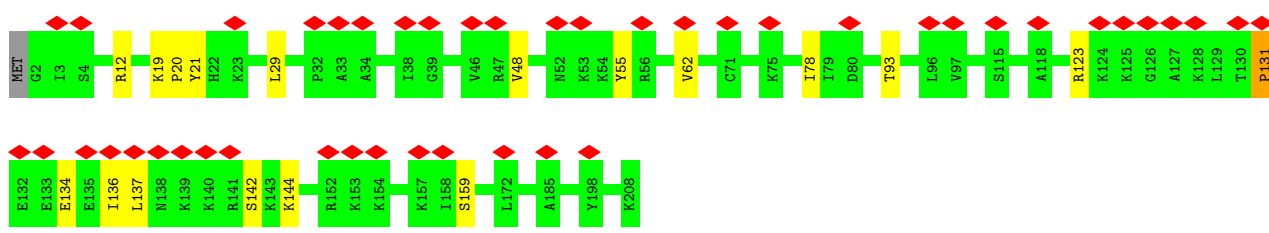
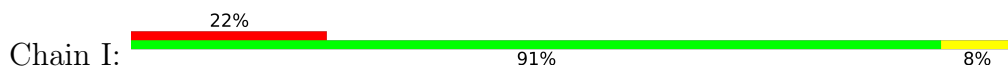




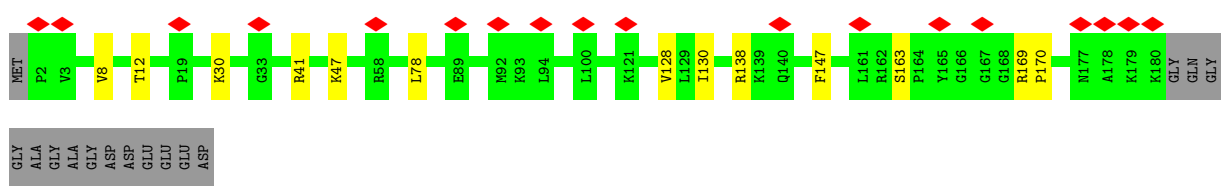
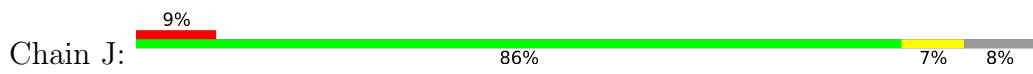
• Molecule 9: 40S RIBOSOMAL PROTEIN S7



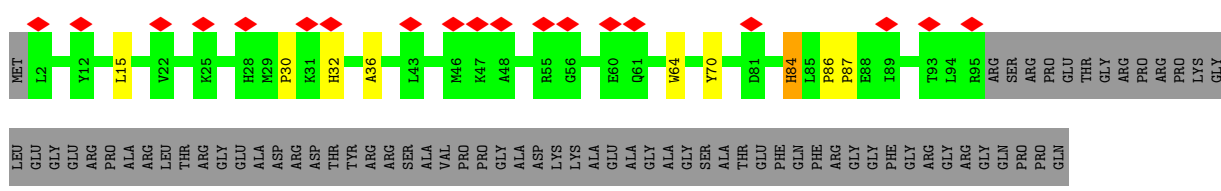
• Molecule 10: 40S RIBOSOMAL PROTEIN S8



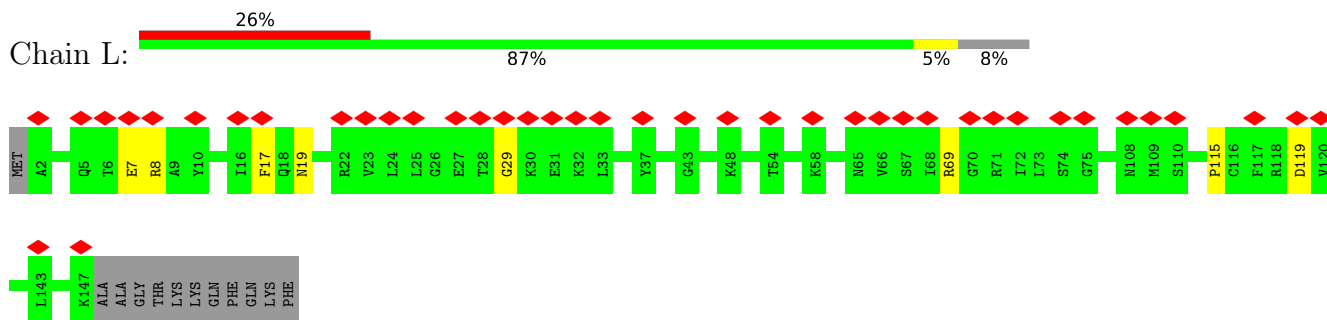
• Molecule 11: 40S RIBOSOMAL PROTEIN S9



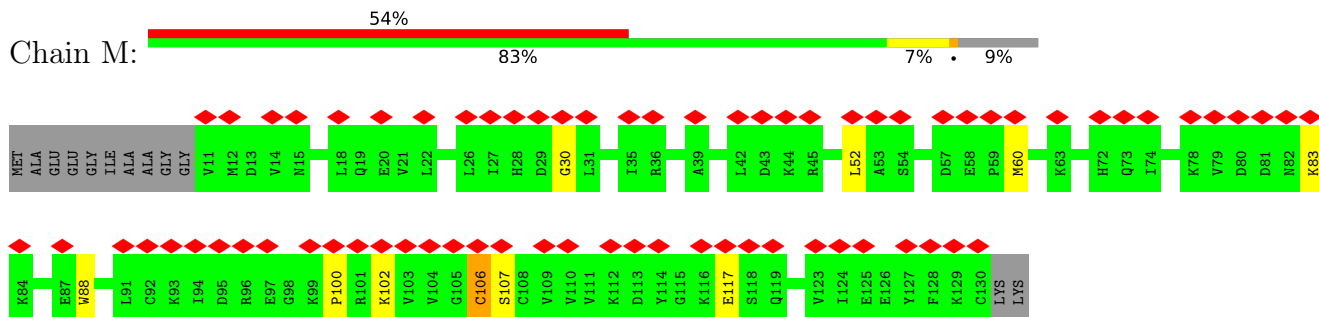
• Molecule 12: 40S RIBOSOMAL PROTEIN S10



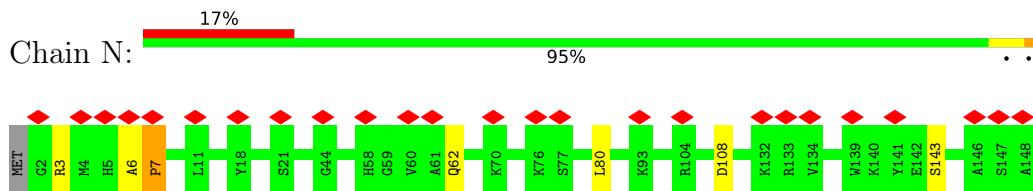
• Molecule 13: 40S RIBOSOMAL PROTEIN S11



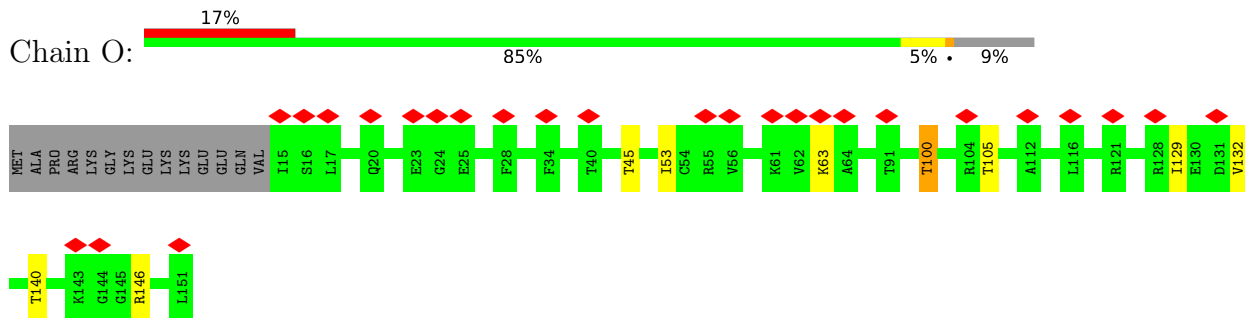
• Molecule 14: 40S RIBOSOMAL PROTEIN S12



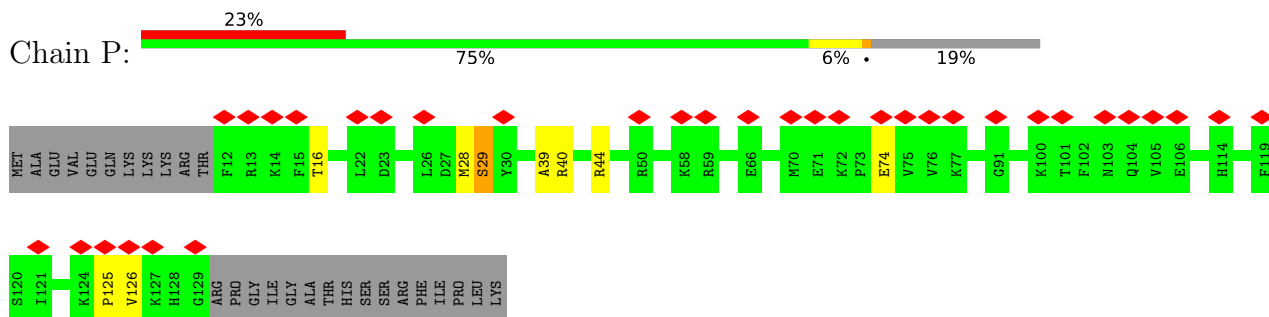
• Molecule 15: 40S RIBOSOMAL PROTEIN S13



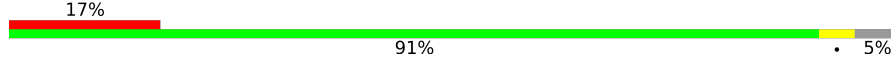
• Molecule 16: 40S RIBOSOMAL PROTEIN S14

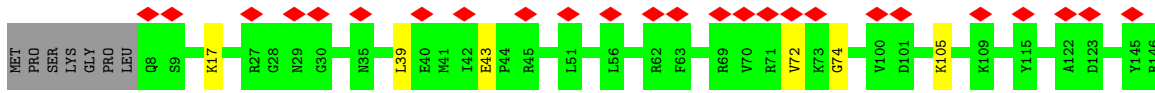


• Molecule 17: 40S RIBOSOMAL PROTEIN S15




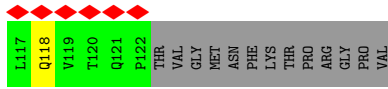
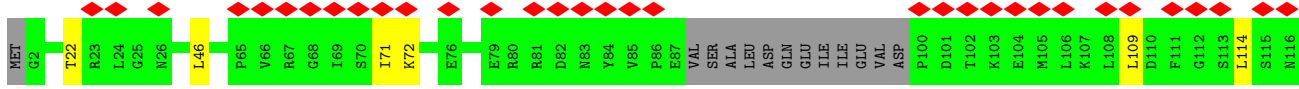
- Molecule 18: 40S RIBOSOMAL PROTEIN S16

Chain Q: 




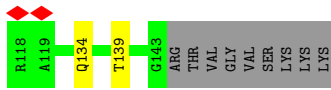
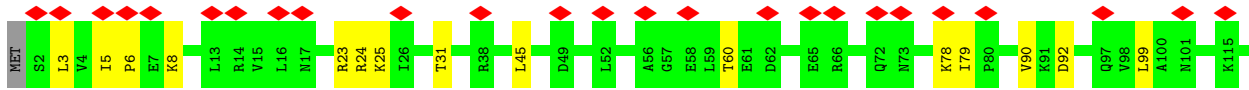
- Molecule 19: 40S RIBOSOMAL PROTEIN S17

Chain R: 

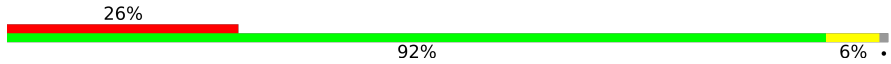


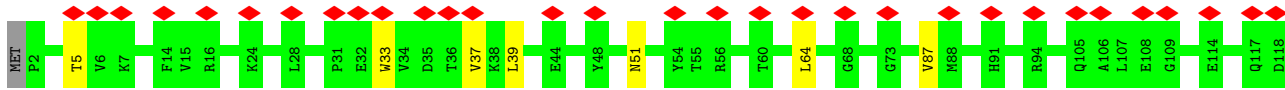
- Molecule 20: 40S RIBOSOMAL PROTEIN S18

Chain S: 




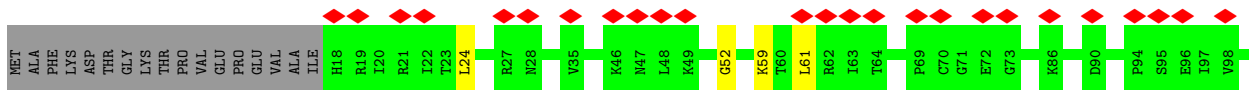
- Molecule 21: 40S RIBOSOMAL PROTEIN S19

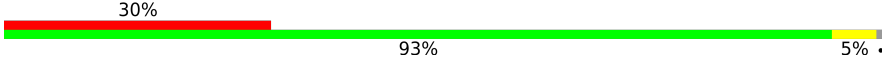
Chain T: 

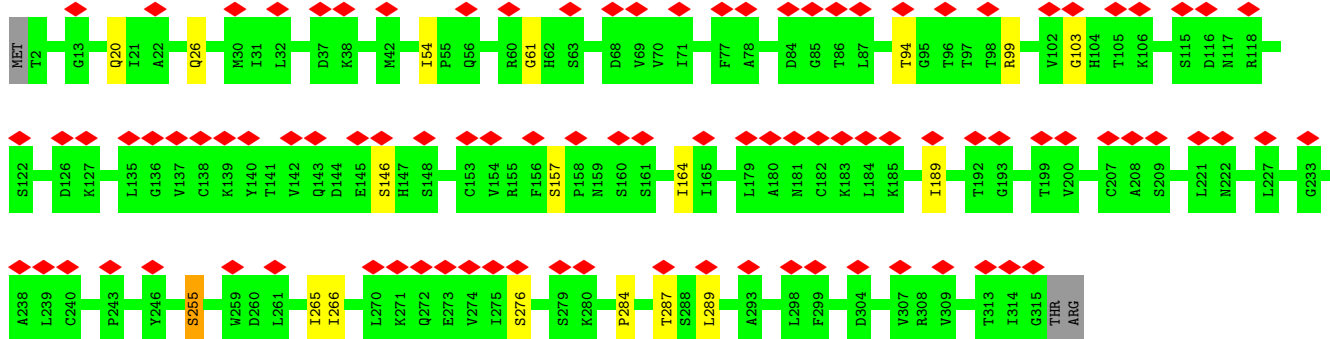


- Molecule 22: 40S RIBOSOMAL PROTEIN S20

Chain U: 

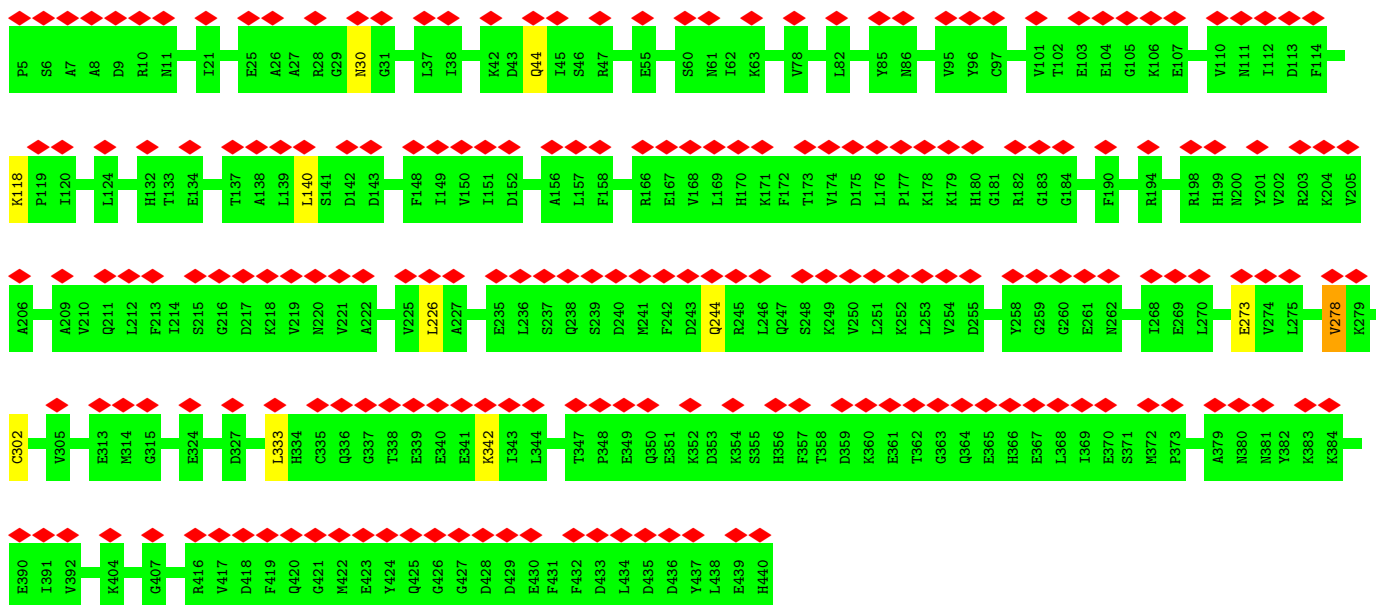


Chain g: 



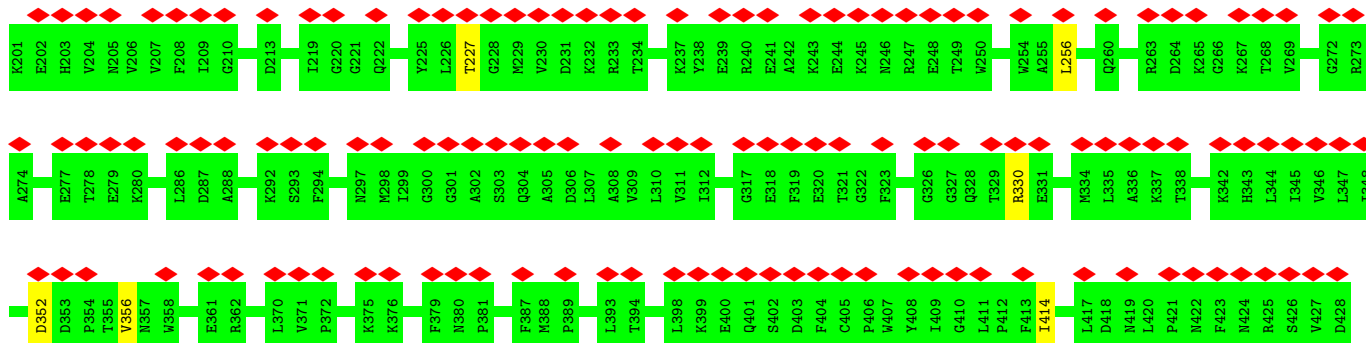
• Molecule 35: EUKARYOTIC PEPTIDE CHAIN RELEASE FACTOR SUBUNIT 1

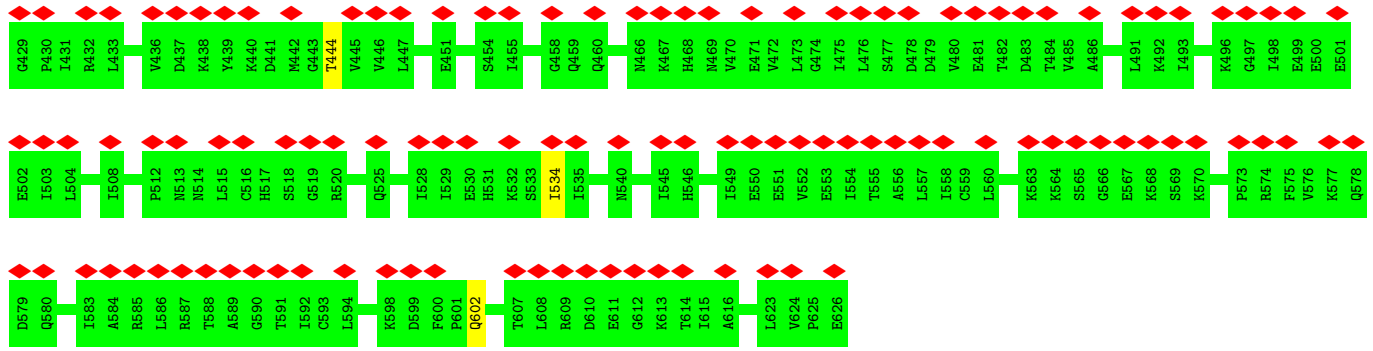
Chain h: 



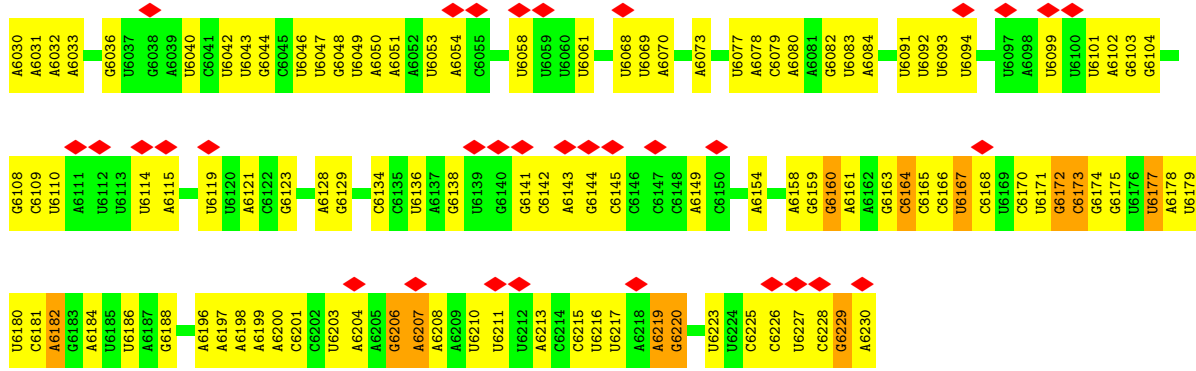
• Molecule 36: EUKARYOTIC PEPTIDE CHAIN RELEASE FACTOR GTP-BINDING SUBUNIT ERF3A

Chain i: 





• Molecule 37: CRICKET PARALYSIS VIRUS IRES RNA



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	64902	Depositor
Resolution determination method	Not provided	
CTF correction method	DEFOCUS GROUPS	Depositor
Microscope	FEI TECNAI F20	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	20	Depositor
Minimum defocus (nm)	2000	Depositor
Maximum defocus (nm)	5000	Depositor
Magnification	194805	Depositor
Image detector	TVIPS TEMCAM-F416 (4k x 4k)	Depositor
Maximum map value	12.165	Depositor
Minimum map value	-4.363	Depositor
Average map value	0.164	Depositor
Map value standard deviation	0.954	Depositor
Recommended contour level	3.0	Depositor
Map size (\AA)	467.99997, 467.99997, 467.99997	wwPDB
Map dimensions	300, 300, 300	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	1.56, 1.56, 1.56	Depositor

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	1	0.37	2/41550 (0.0%)	0.80	6/64763 (0.0%)
2	A	0.51	0/1756	0.68	0/2386
3	B	0.51	0/1756	0.75	1/2350 (0.0%)
4	C	0.42	0/1761	0.65	0/2379
5	D	0.41	0/1672	0.66	0/2250
6	E	0.47	0/2072	0.70	0/2793
7	F	0.43	0/1507	0.74	0/2026
8	G	0.48	0/1907	0.74	0/2538
9	H	0.46	0/1558	0.74	1/2087 (0.0%)
10	I	0.48	0/1724	0.72	0/2298
11	J	0.45	0/1520	0.77	0/2030
12	K	0.48	0/815	0.68	0/1101
13	L	0.45	0/1220	0.72	0/1633
14	M	0.48	0/941	0.72	0/1264
15	N	0.43	0/1231	0.73	1/1656 (0.1%)
16	O	0.46	0/1036	0.71	0/1391
17	P	0.43	0/1000	0.67	0/1335
18	Q	0.43	0/1125	0.66	0/1506
19	R	0.42	0/904	0.67	0/1208
20	S	0.42	0/1190	0.68	0/1594
21	T	0.44	0/1131	0.69	0/1515
22	U	0.50	0/813	0.70	0/1092
23	V	0.47	0/643	0.71	0/860
24	W	0.44	0/1050	0.69	0/1406
25	X	0.46	0/1063	0.70	0/1421
26	Y	0.45	0/1019	0.70	0/1354
27	Z	0.46	0/611	0.71	0/820
28	a	0.48	0/778	0.75	1/1041 (0.1%)
29	b	0.48	0/637	0.68	0/854
30	c	0.46	0/492	0.74	0/657
31	d	0.51	0/454	0.77	0/603
32	e	0.45	0/417	0.69	0/548
33	f	0.53	0/507	0.84	1/673 (0.1%)
34	g	0.45	0/2497	0.67	0/3399

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
35	h	0.35	0/3506	0.56	0/4709
36	i	0.37	0/3418	0.55	0/4600
37	j	1.42	85/4752 (1.8%)	1.74	207/7383 (2.8%)
All	All	0.52	87/92033 (0.1%)	0.83	218/133523 (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	1	0	24
37	j	0	1
All	All	0	25

All (87) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
37	j	6173	C	O3'-P	-20.14	1.36	1.61
37	j	6229	G	O3'-P	19.64	1.84	1.61
37	j	6079	C	N3-C4	19.19	1.47	1.33
37	j	6177	U	O3'-P	-18.39	1.39	1.61
37	j	6219	A	O3'-P	-15.97	1.42	1.61
37	j	6215	C	O3'-P	-15.56	1.42	1.61
37	j	6206	G	O3'-P	14.96	1.79	1.61
37	j	6213	A	O3'-P	-14.33	1.44	1.61
37	j	6198	A	O3'-P	13.52	1.77	1.61
37	j	6182	A	O3'-P	-13.20	1.45	1.61
37	j	6078	A	N9-C4	12.20	1.45	1.37
37	j	6207	A	O3'-P	-11.97	1.46	1.61
37	j	6104	G	N3-C4	-10.58	1.28	1.35
37	j	6166	C	O3'-P	-10.38	1.48	1.61
37	j	6216	U	O3'-P	10.20	1.73	1.61
37	j	6199	A	O3'-P	-10.09	1.49	1.61
37	j	6104	G	C6-N1	10.05	1.46	1.39
37	j	6047	U	C4-O4	10.00	1.31	1.23
37	j	6115	A	C6-N1	9.87	1.42	1.35
37	j	6161	A	N7-C5	9.50	1.45	1.39
37	j	6145	C	N3-C4	9.47	1.40	1.33
37	j	6160	G	N7-C5	9.44	1.45	1.39
37	j	6144	G	N9-C8	-9.36	1.31	1.37
37	j	6091	U	N1-C2	9.30	1.47	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
37	j	6092	U	C2-N3	-8.70	1.31	1.37
37	j	6091	U	C5-C6	8.22	1.41	1.34
37	j	6050	A	C6-N1	7.82	1.41	1.35
37	j	6172	G	O3 [?] -P	7.82	1.70	1.61
37	j	6104	G	C8-N7	7.79	1.35	1.30
37	j	6058	U	O3 [?] -P	7.72	1.70	1.61
37	j	6108	G	C8-N7	-7.46	1.26	1.30
37	j	6144	G	N9-C4	-7.41	1.32	1.38
37	j	6109	C	N1-C6	-7.35	1.32	1.37
37	j	6170	C	O3 [?] -P	7.34	1.70	1.61
37	j	6225	C	O3 [?] -P	-7.27	1.52	1.61
37	j	6145	C	C2-O2	6.94	1.30	1.24
37	j	6167	U	O3 [?] -P	-6.82	1.52	1.61
37	j	6109	C	N3-C4	6.82	1.38	1.33
37	j	6159	G	C6-O6	-6.68	1.18	1.24
37	j	6181	C	O3 [?] -P	6.51	1.69	1.61
37	j	6046	U	N3-C4	-6.49	1.32	1.38
37	j	6142	C	N1-C6	-6.46	1.33	1.37
37	j	6104	G	N1-C2	-6.46	1.32	1.37
37	j	6082	G	N7-C5	6.41	1.43	1.39
37	j	6178	A	O3 [?] -P	-6.33	1.53	1.61
1	1	992	A	C6-N6	-6.31	1.28	1.33
37	j	6048	G	N9-C8	-6.09	1.33	1.37
37	j	6197	A	O3 [?] -P	-6.05	1.53	1.61
37	j	6040	U	C4-O4	6.04	1.28	1.23
37	j	6048	G	N7-C5	6.03	1.42	1.39
37	j	6141	G	C6-N1	-6.02	1.35	1.39
37	j	6159	G	N7-C5	-5.99	1.35	1.39
37	j	6091	U	N1-C6	-5.92	1.32	1.38
37	j	6149	A	N3-C4	5.91	1.38	1.34
37	j	6077	U	N3-C4	5.89	1.43	1.38
37	j	6142	C	N3-C4	5.83	1.38	1.33
37	j	6175	G	O3 [?] -P	5.82	1.68	1.61
37	j	6161	A	N9-C4	5.73	1.41	1.37
37	j	6143	A	N7-C5	5.73	1.42	1.39
37	j	6040	U	C5-C6	5.72	1.39	1.34
37	j	6078	A	N3-C4	-5.71	1.31	1.34
37	j	6030	A	C5-C6	5.71	1.46	1.41
37	j	6094	U	N1-C6	-5.71	1.32	1.38
37	j	6108	G	C6-N1	5.68	1.43	1.39
37	j	6093	U	C2-N3	-5.60	1.33	1.37
37	j	6092	U	C4-O4	5.54	1.28	1.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
37	j	6144	G	C2-N2	5.44	1.40	1.34
37	j	6080	A	N7-C5	5.44	1.42	1.39
37	j	6092	U	C2-O2	5.42	1.27	1.22
37	j	6220	G	O3'-P	-5.41	1.54	1.61
37	j	6142	C	C5-C6	5.40	1.38	1.34
37	j	6049	U	C4-C5	5.40	1.48	1.43
37	j	6144	G	C2-N3	5.36	1.37	1.32
37	j	6091	U	N3-C4	-5.35	1.33	1.38
37	j	6051	A	N9-C4	-5.34	1.34	1.37
1	1	1286	G	C2-N2	-5.29	1.29	1.34
37	j	6114	U	C4-C5	5.21	1.48	1.43
37	j	6050	A	N7-C5	-5.20	1.36	1.39
37	j	6078	A	C6-N6	-5.18	1.29	1.33
37	j	6080	A	C5-C4	-5.16	1.35	1.38
37	j	6159	G	N9-C4	5.15	1.42	1.38
37	j	6092	U	C4-C5	-5.11	1.39	1.43
37	j	6164	C	O3'-P	-5.10	1.55	1.61
37	j	6180	U	O3'-P	-5.07	1.55	1.61
37	j	6080	A	N1-C2	5.05	1.38	1.34
37	j	6108	G	N3-C4	-5.05	1.31	1.35
37	j	6173	C	O4'-C1'	5.05	1.48	1.41

All (218) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
37	j	6079	C	C5-C6-N1	19.25	130.62	121.00
37	j	6114	U	C4-C5-C6	-18.58	108.55	119.70
37	j	6114	U	N3-C4-C5	17.39	125.03	114.60
37	j	6077	U	C2-N3-C4	-15.00	118.00	127.00
37	j	6161	A	N1-C2-N3	-15.00	121.80	129.30
37	j	6046	U	C2-N3-C4	-14.81	118.11	127.00
37	j	6103	G	N7-C8-N9	-14.81	105.70	113.10
37	j	6049	U	N3-C2-O2	-14.63	111.96	122.20
37	j	6103	G	C8-N9-C4	14.53	112.21	106.40
37	j	6092	U	N1-C2-N3	14.31	123.48	114.90
37	j	6077	U	N3-C4-C5	13.28	122.57	114.60
37	j	6046	U	N3-C4-C5	13.12	122.47	114.60
37	j	6048	G	C5-C6-O6	-13.05	120.77	128.60
37	j	6173	C	O4'-C1'-N1	12.97	118.58	108.20
37	j	6092	U	C2-N3-C4	-12.54	119.47	127.00
37	j	6114	U	C5-C4-O4	-12.39	118.47	125.90
37	j	6093	U	N3-C4-O4	-12.37	110.74	119.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
37	j	6160	G	C5-C6-O6	-12.02	121.39	128.60
37	j	6031	A	C6-N1-C2	11.89	125.74	118.60
37	j	6142	C	N1-C2-O2	11.82	125.99	118.90
37	j	6049	U	C5-C4-O4	-11.74	118.86	125.90
37	j	6078	A	C5-N7-C8	11.65	109.72	103.90
37	j	6149	A	C8-N9-C4	-11.49	101.20	105.80
37	j	6143	A	C5-C6-N1	-11.45	111.98	117.70
37	j	6103	G	C5-C6-N1	11.43	117.21	111.50
37	j	6104	G	C6-N1-C2	-11.37	118.28	125.10
37	j	6030	A	N3-C4-C5	11.15	134.60	126.80
37	j	6048	G	C2-N3-C4	11.11	117.46	111.90
37	j	6172	G	P-O3'-C3'	-11.10	106.38	119.70
37	j	6083	U	C5-C4-O4	-10.84	119.40	125.90
37	j	6114	U	C6-N1-C2	10.83	127.50	121.00
37	j	6078	A	N1-C6-N6	10.50	124.90	118.60
37	j	6108	G	C4-C5-N7	10.31	114.92	110.80
37	j	6031	A	N1-C2-N3	-10.26	124.17	129.30
37	j	6047	U	C2-N3-C4	-10.18	120.89	127.00
37	j	6161	A	C6-N1-C2	10.05	124.63	118.60
37	j	6049	U	N1-C2-O2	9.90	129.73	122.80
37	j	6079	C	C4-C5-C6	-9.86	112.47	117.40
37	j	6093	U	C2-N3-C4	-9.85	121.09	127.00
37	j	6109	C	N3-C4-N4	-9.80	111.14	118.00
37	j	6046	U	N1-C2-N3	9.78	120.77	114.90
37	j	6108	G	N3-C4-C5	9.74	133.47	128.60
37	j	6144	G	N7-C8-N9	9.69	117.95	113.10
37	j	6143	A	N1-C6-N6	9.68	124.41	118.60
37	j	6149	A	N7-C8-N9	9.66	118.63	113.80
37	j	6046	U	C5-C4-O4	-9.57	120.16	125.90
37	j	6143	A	C4-C5-C6	9.47	121.73	117.00
37	j	6083	U	N1-C2-N3	9.37	120.52	114.90
37	j	6109	C	C4-C5-C6	-9.30	112.75	117.40
37	j	6160	G	C6-C5-N7	9.29	135.97	130.40
37	j	6149	A	N9-C4-C5	9.28	109.51	105.80
37	j	6040	U	N1-C2-O2	-9.23	116.34	122.80
37	j	6149	A	N1-C2-N3	-9.22	124.69	129.30
37	j	6160	G	C4-C5-N7	-9.22	107.11	110.80
37	j	6144	G	C5-N7-C8	-9.19	99.70	104.30
37	j	6030	A	N3-C4-N9	-9.18	120.06	127.40
37	j	6149	A	C2-N3-C4	9.18	115.19	110.60
37	j	6079	C	C6-N1-C2	-9.17	116.63	120.30
37	j	6050	A	N9-C4-C5	9.13	109.45	105.80

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
37	j	6102	A	C8-N9-C4	-9.05	102.18	105.80
37	j	6110	U	N1-C2-O2	-9.04	116.47	122.80
37	j	6161	A	C2-N3-C4	8.99	115.10	110.60
37	j	6047	U	N1-C2-N3	8.90	120.24	114.90
37	j	6083	U	C2-N3-C4	-8.88	121.67	127.00
37	j	6144	G	N3-C4-C5	-8.87	124.17	128.60
37	j	6182	A	OP2-P-O3'	8.82	124.61	105.20
37	j	6077	U	N3-C4-O4	-8.82	113.23	119.40
37	j	6030	A	C4-C5-C6	-8.81	112.60	117.00
37	j	6049	U	C2-N3-C4	-8.78	121.73	127.00
37	j	6049	U	N3-C4-C5	8.77	119.86	114.60
37	j	6160	G	C5-C6-N1	8.62	115.81	111.50
37	j	6114	U	C2-N3-C4	-8.55	121.87	127.00
37	j	6145	C	N3-C4-N4	8.54	123.98	118.00
37	j	6109	C	C6-N1-C2	8.41	123.67	120.30
37	j	6196	A	P-O3'-C3'	-8.40	109.62	119.70
37	j	6104	G	N1-C2-N3	8.38	128.93	123.90
37	j	6144	G	N3-C2-N2	-8.37	114.04	119.90
37	j	6093	U	N3-C4-C5	8.20	119.52	114.60
37	j	6040	U	N3-C4-C5	8.16	119.49	114.60
37	j	6047	U	N1-C2-O2	-8.06	117.16	122.80
37	j	6103	G	C5-N7-C8	7.97	108.29	104.30
37	j	6141	G	N1-C2-N3	7.96	128.68	123.90
37	j	6080	A	N1-C2-N3	-7.94	125.33	129.30
37	j	6092	U	N3-C4-C5	7.94	119.36	114.60
37	j	6110	U	C5-C6-N1	7.94	126.67	122.70
37	j	6108	G	C6-N1-C2	-7.93	120.34	125.10
37	j	6103	G	C6-N1-C2	-7.90	120.36	125.10
37	j	6110	U	C6-N1-C2	-7.87	116.28	121.00
37	j	6145	C	N3-C2-O2	7.86	127.40	121.90
37	j	6200	A	P-O3'-C3'	-7.81	110.33	119.70
37	j	6050	A	C8-N9-C4	-7.67	102.73	105.80
37	j	6030	A	C2-N3-C4	-7.65	106.77	110.60
37	j	6102	A	N3-C4-N9	-7.60	121.32	127.40
37	j	6144	G	N3-C4-N9	7.58	130.55	126.00
37	j	6108	G	N9-C4-C5	-7.56	102.38	105.40
37	j	6079	C	C2-N3-C4	7.55	123.68	119.90
37	j	6048	G	C8-N9-C4	7.54	109.41	106.40
37	j	6102	A	N7-C8-N9	7.53	117.56	113.80
37	j	6145	C	N3-C4-C5	-7.46	118.92	121.90
37	j	6083	U	N3-C4-C5	7.41	119.04	114.60
37	j	6160	G	C8-N9-C4	7.39	109.36	106.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
37	j	6092	U	N1-C2-O2	-7.37	117.64	122.80
37	j	6102	A	N9-C4-C5	7.36	108.74	105.80
37	j	6108	G	C5-C6-N1	7.34	115.17	111.50
37	j	6109	C	C5-C4-N4	7.33	125.33	120.20
37	j	6040	U	C2-N3-C4	-7.29	122.62	127.00
37	j	6161	A	N1-C6-N6	7.27	122.96	118.60
37	j	6173	C	P-O3'-C3'	-7.23	111.03	119.70
37	j	6078	A	N1-C2-N3	-7.22	125.69	129.30
37	j	6031	A	N1-C6-N6	7.20	122.92	118.60
37	j	6198	A	O3'-P-O5'	-7.19	90.34	104.00
37	j	6115	A	C5-C6-N1	-7.17	114.11	117.70
37	j	6167	U	O3'-P-O5'	7.11	117.51	104.00
37	j	6143	A	C6-N1-C2	7.10	122.86	118.60
37	j	6048	G	C5-C6-N1	7.09	115.05	111.50
37	j	6141	G	C8-N9-C4	7.09	109.24	106.40
37	j	6159	G	C5-C6-N1	7.07	115.03	111.50
37	j	6141	G	C6-N1-C2	-7.04	120.88	125.10
37	j	6083	U	C6-N1-C2	-7.00	116.80	121.00
37	j	6173	C	OP1-P-O3'	-6.99	89.83	105.20
37	j	6079	C	N3-C4-C5	-6.96	119.11	121.90
37	j	6182	A	O3'-P-O5'	-6.91	90.86	104.00
37	j	6199	A	OP2-P-O3'	6.91	120.41	105.20
37	j	6078	A	N7-C8-N9	-6.91	110.35	113.80
37	j	6048	G	N1-C6-O6	6.87	124.02	119.90
37	j	6094	U	C5-C6-N1	6.85	126.12	122.70
37	j	6092	U	C5-C4-O4	-6.80	121.82	125.90
37	j	6070	A	P-O3'-C3'	6.74	127.79	119.70
37	j	6110	U	C5-C4-O4	-6.73	121.86	125.90
37	j	6093	U	C5-C6-N1	-6.72	119.34	122.70
37	j	6048	G	N3-C4-C5	-6.70	125.25	128.60
37	j	6093	U	N1-C2-N3	6.70	118.92	114.90
37	j	6199	A	P-O3'-C3'	6.61	127.63	119.70
37	j	6173	C	OP2-P-O3'	6.54	119.59	105.20
37	j	6141	G	N3-C4-C5	-6.54	125.33	128.60
37	j	6197	A	P-O3'-C3'	-6.51	111.89	119.70
37	j	6051	A	C6-N1-C2	6.50	122.50	118.60
37	j	6048	G	N3-C4-N9	6.47	129.88	126.00
37	j	6094	U	C6-N1-C2	-6.42	117.15	121.00
37	j	6079	C	C5-C4-N4	6.41	124.68	120.20
37	j	6159	G	C8-N9-C4	-6.40	103.84	106.40
37	j	6171	U	OP2-P-O3'	6.40	119.28	105.20
37	j	6184	A	P-O3'-C3'	6.37	127.34	119.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
37	j	6031	A	C5-C6-N1	-6.33	114.53	117.70
37	j	6175	G	OP2-P-O3'	6.28	119.00	105.20
37	j	6050	A	N3-C4-N9	-6.25	122.40	127.40
37	j	6108	G	C5-N7-C8	-6.23	101.18	104.30
37	j	6143	A	N7-C8-N9	6.21	116.90	113.80
37	j	6208	A	P-O3'-C3'	6.20	127.14	119.70
37	j	6103	G	N3-C4-N9	6.19	129.72	126.00
37	j	6110	U	N3-C4-C5	6.19	118.31	114.60
37	j	6109	C	C5-C6-N1	6.18	124.09	121.00
37	j	6078	A	C4-C5-N7	-6.15	107.62	110.70
37	j	6142	C	N3-C2-O2	-6.14	117.60	121.90
37	j	6048	G	C6-C5-N7	6.13	134.08	130.40
37	j	6093	U	C5-C4-O4	6.09	129.56	125.90
37	j	6078	A	C5-C6-N6	-6.07	118.84	123.70
37	j	6175	G	O3'-P-O5'	-6.05	92.50	104.00
1	1	502	C	C3'-C2'-C1'	-6.04	96.66	101.50
37	j	6141	G	C6-C5-N7	-6.04	126.78	130.40
37	j	6134	C	C5-C4-N4	6.00	124.40	120.20
37	j	6164	C	O4'-C1'-N1	5.97	112.98	108.20
37	j	6201	C	O4'-C1'-N1	5.96	112.97	108.20
37	j	6166	C	O3'-P-O5'	5.94	115.29	104.00
37	j	6048	G	N1-C2-N3	-5.92	120.35	123.90
37	j	6142	C	C6-N1-C2	5.90	122.66	120.30
37	j	6160	G	N3-C4-C5	-5.89	125.65	128.60
37	j	6114	U	N1-C2-N3	-5.87	111.38	114.90
37	j	6144	G	C4-C5-C6	5.84	122.31	118.80
37	j	6031	A	C2-N3-C4	5.80	113.50	110.60
37	j	6078	A	C6-C5-N7	5.79	136.35	132.30
37	j	6108	G	C4-C5-C6	-5.77	115.34	118.80
37	j	6047	U	C4-C5-C6	5.77	123.16	119.70
37	j	6077	U	C4-C5-C6	-5.77	116.24	119.70
37	j	6103	G	C6-C5-N7	5.76	133.86	130.40
37	j	6145	C	N1-C2-O2	-5.75	115.45	118.90
37	j	6188	G	O4'-C1'-N9	5.67	112.73	108.20
37	j	6149	A	C4-C5-N7	-5.64	107.88	110.70
37	j	6182	A	O4'-C1'-N9	5.64	112.71	108.20
37	j	6108	G	N7-C8-N9	5.62	115.91	113.10
37	j	6040	U	N3-C4-O4	-5.62	115.47	119.40
37	j	6092	U	C6-N1-C2	-5.61	117.63	121.00
37	j	6141	G	N3-C4-N9	5.61	129.37	126.00
37	j	6102	A	N1-C6-N6	5.60	121.96	118.60
37	j	6040	U	N1-C2-N3	5.58	118.25	114.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
37	j	6219	A	O3'-P-O5'	5.58	114.61	104.00
1	1	1441	U	C3'-C2'-C1'	-5.56	97.06	101.50
37	j	6082	G	C5-N7-C8	-5.54	101.53	104.30
1	1	645	C	C3'-C2'-C1'	-5.51	97.09	101.50
37	j	6114	U	C5-C6-N1	5.47	125.43	122.70
37	j	6186	U	P-O3'-C3'	5.44	126.23	119.70
37	j	6134	C	N3-C4-N4	-5.42	114.21	118.00
37	j	6115	A	C8-N9-C4	5.41	107.96	105.80
15	N	6	ALA	N-CA-C	-5.40	96.41	111.00
37	j	6103	G	C5-C6-O6	-5.38	125.37	128.60
37	j	6051	A	N1-C2-N3	-5.38	126.61	129.30
37	j	6094	U	N1-C2-N3	5.36	118.12	114.90
37	j	6110	U	N3-C2-O2	5.29	125.90	122.20
37	j	6108	G	N1-C6-O6	-5.28	116.73	119.90
9	H	109	ARG	N-CA-CB	5.26	120.08	110.60
1	1	1422	G	C3'-C2'-C1'	-5.25	97.30	101.50
1	1	797	C	N1-C1'-C2'	-5.24	106.23	112.00
3	B	132	GLY	N-CA-C	5.24	126.20	113.10
37	j	6083	U	P-O3'-C3'	5.22	125.96	119.70
37	j	6149	A	C6-N1-C2	5.14	121.69	118.60
37	j	6145	C	C2-N3-C4	5.14	122.47	119.90
33	f	124	ASP	N-CA-C	-5.13	97.14	111.00
37	j	6160	G	C2-N3-C4	5.10	114.45	111.90
37	j	6103	G	N3-C4-C5	-5.08	126.06	128.60
1	1	1147	C	C3'-C2'-C1'	-5.06	97.45	101.50
28	a	5	ARG	N-CA-CB	-5.06	101.49	110.60
37	j	6092	U	N3-C2-O2	-5.05	118.66	122.20
37	j	6110	U	C2-N3-C4	-5.04	123.98	127.00
37	j	6145	C	C5-C6-N1	5.04	123.52	121.00
37	j	6082	G	C8-N9-C1'	5.03	133.54	127.00
37	j	6144	G	N1-C2-N2	5.01	120.71	116.20
37	j	6177	U	OP2-P-O3'	5.01	116.23	105.20
37	j	6083	U	N1-C2-O2	-5.01	119.29	122.80

There are no chirality outliers.

All (25) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	1	111	A	Sidechain
1	1	1120	U	Sidechain
1	1	1288	U	Sidechain
1	1	1308	U	Sidechain

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Mol	Chain	Res	Type	Group
1	1	1414	A	Sidechain
1	1	1548	G	Sidechain
1	1	1578	U	Sidechain
1	1	1624	U	Sidechain
1	1	1686	G	Sidechain
1	1	1823	A	Sidechain
1	1	216	C	Sidechain
1	1	235	A	Sidechain
1	1	44	U	Sidechain
1	1	570	C	Sidechain
1	1	572	U	Sidechain
1	1	643	A	Sidechain
1	1	645	C	Sidechain
1	1	747	U	Sidechain
1	1	77	A	Sidechain
1	1	799	U	Sidechain
1	1	84	A	Sidechain
1	1	867	G	Sidechain
1	1	88	G	Sidechain
1	1	897	U	Sidechain
37	j	6160	G	Sidechain

5.2 Too-close contacts [i](#)

Due to software issues we are unable to calculate clashes - this section is therefore empty.

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 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	
2	A	216/295 (73%)	209 (97%)	5 (2%)	2 (1%)	17	57
3	B	211/264 (80%)	176 (83%)	18 (8%)	17 (8%)	1	12

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
4	C	220/293 (75%)	213 (97%)	2 (1%)	5 (2%)	6	34
5	D	210/243 (86%)	201 (96%)	4 (2%)	5 (2%)	6	33
6	E	255/263 (97%)	237 (93%)	13 (5%)	5 (2%)	7	38
7	F	186/204 (91%)	163 (88%)	13 (7%)	10 (5%)	2	19
8	G	230/249 (92%)	216 (94%)	5 (2%)	9 (4%)	3	23
9	H	189/194 (97%)	178 (94%)	7 (4%)	4 (2%)	7	36
10	I	205/208 (99%)	184 (90%)	14 (7%)	7 (3%)	3	26
11	J	177/194 (91%)	168 (95%)	6 (3%)	3 (2%)	9	42
12	K	92/165 (56%)	84 (91%)	1 (1%)	7 (8%)	1	13
13	L	144/158 (91%)	133 (92%)	5 (4%)	6 (4%)	3	22
14	M	118/132 (89%)	111 (94%)	1 (1%)	6 (5%)	2	19
15	N	148/151 (98%)	138 (93%)	5 (3%)	5 (3%)	3	26
16	O	135/151 (89%)	129 (96%)	3 (2%)	3 (2%)	6	35
17	P	116/145 (80%)	106 (91%)	5 (4%)	5 (4%)	2	22
18	Q	137/146 (94%)	129 (94%)	6 (4%)	2 (2%)	10	46
19	R	105/135 (78%)	99 (94%)	4 (4%)	2 (2%)	8	38
20	S	140/152 (92%)	125 (89%)	7 (5%)	8 (6%)	1	18
21	T	141/145 (97%)	135 (96%)	4 (3%)	2 (1%)	11	46
22	U	99/119 (83%)	95 (96%)	3 (3%)	1 (1%)	15	55
23	V	81/83 (98%)	78 (96%)	1 (1%)	2 (2%)	5	32
24	W	127/130 (98%)	118 (93%)	7 (6%)	2 (2%)	9	44
25	X	132/143 (92%)	120 (91%)	5 (4%)	7 (5%)	2	19
26	Y	120/133 (90%)	114 (95%)	2 (2%)	4 (3%)	4	26
27	Z	74/125 (59%)	71 (96%)	0	3 (4%)	3	23
28	a	94/115 (82%)	85 (90%)	5 (5%)	4 (4%)	2	22
29	b	78/84 (93%)	70 (90%)	8 (10%)	0	100	100
30	c	60/69 (87%)	57 (95%)	1 (2%)	2 (3%)	4	26
31	d	51/56 (91%)	44 (86%)	7 (14%)	0	100	100
32	e	49/59 (83%)	43 (88%)	5 (10%)	1 (2%)	7	38
33	f	59/156 (38%)	53 (90%)	6 (10%)	0	100	100
34	g	312/317 (98%)	291 (93%)	14 (4%)	7 (2%)	6	35

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
35	h	428/436 (98%)	410 (96%)	14 (3%)	4 (1%)	17	57
36	i	414/426 (97%)	403 (97%)	9 (2%)	2 (0%)	29	69
All	All	5553/6338 (88%)	5186 (93%)	215 (4%)	152 (3%)	8	31

All (152) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	B	76	ASN
3	B	132	GLY
3	B	148	ASN
3	B	154	SER
3	B	176	VAL
3	B	177	GLN
3	B	207	LEU
3	B	221	PRO
4	C	64	THR
4	C	172	ASN
4	C	176	LYS
5	D	78	GLY
5	D	199	GLY
6	E	204	SER
6	E	205	PHE
7	F	20	PHE
7	F	22	LYS
7	F	40	ALA
7	F	48	TYR
7	F	80	GLY
7	F	132	GLY
7	F	185	SER
8	G	43	GLU
8	G	146	ASN
8	G	147	LEU
8	G	169	PRO
9	H	88	SER
9	H	135	PHE
10	I	123	ARG
10	I	131	PRO
10	I	134	GLU
10	I	142	SER
10	I	159	SER
12	K	30	PRO

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Mol	Chain	Res	Type
12	K	32	HIS
12	K	36	ALA
12	K	84	HIS
12	K	87	PRO
13	L	8	ARG
13	L	19	ASN
15	N	7	PRO
15	N	108	ASP
16	O	100	THR
16	O	146	ARG
17	P	29	SER
17	P	126	VAL
19	R	72	LYS
20	S	78	LYS
20	S	79	ILE
20	S	134	GLN
21	T	37	VAL
22	U	52	GLY
23	V	42	VAL
24	W	100	GLY
25	X	61	GLN
25	X	106	GLY
25	X	107	ARG
25	X	116	PRO
26	Y	33	ALA
26	Y	98	GLU
27	Z	95	GLY
34	g	255	SER
34	g	284	PRO
35	h	244	GLN
35	h	273	GLU
35	h	278	VAL
36	i	356	VAL
2	A	6	ASP
3	B	52	THR
3	B	78	GLU
3	B	127	VAL
3	B	209	ASP
4	C	174	ILE
5	D	81	GLU
6	E	231	GLY
6	E	243	GLY

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Mol	Chain	Res	Type
7	F	34	SER
7	F	56	TYR
8	G	87	ARG
8	G	157	VAL
9	H	164	ASN
12	K	64	TRP
13	L	119	ASP
14	M	30	GLY
14	M	60	MET
14	M	106	CYS
14	M	107	SER
15	N	143	SER
19	R	114	LEU
20	S	24	ARG
20	S	31	THR
20	S	90	VAL
20	S	92	ASP
23	V	48	GLY
28	a	61	ALA
34	g	276	SER
3	B	49	VAL
3	B	213	ARG
5	D	142	LEU
6	E	203	GLY
7	F	79	HIS
8	G	91	GLU
8	G	92	ARG
9	H	109	ARG
13	L	7	GLU
14	M	102	LYS
15	N	3	ARG
18	Q	17	LYS
18	Q	74	GLY
25	X	33	GLY
25	X	86	PRO
26	Y	64	PHE
27	Z	113	THR
28	a	81	SER
30	c	38	THR
36	i	352	ASP
15	N	62	GLN
17	P	39	ALA

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Mol	Chain	Res	Type
24	W	28	ARG
25	X	75	ILE
26	Y	119	GLY
30	c	64	GLU
34	g	146	SER
4	C	261	PHE
8	G	88	ARG
11	J	138	ARG
11	J	169	ARG
13	L	115	PRO
17	P	28	MET
17	P	125	PRO
21	T	51	ASN
27	Z	114	LYS
28	a	38	LYS
32	e	8	ARG
35	h	118	LYS
2	A	104	THR
3	B	23	ASP
3	B	210	VAL
10	I	12	ARG
20	S	6	PRO
28	a	84	VAL
3	B	64	GLY
11	J	170	PRO
12	K	86	PRO
13	L	29	GLY
14	M	100	PRO
34	g	103	GLY
10	I	20	PRO
16	O	53	ILE
34	g	61	GLY
34	g	265	ILE
5	D	63	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 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	
2	A	181/243 (74%)	176 (97%)	5 (3%)	43	65
3	B	194/231 (84%)	183 (94%)	11 (6%)	20	45
4	C	188/225 (84%)	181 (96%)	7 (4%)	34	58
5	D	175/202 (87%)	166 (95%)	9 (5%)	24	48
6	E	220/225 (98%)	208 (94%)	12 (6%)	21	47
7	F	158/170 (93%)	151 (96%)	7 (4%)	28	53
8	G	202/218 (93%)	195 (96%)	7 (4%)	36	59
9	H	171/174 (98%)	167 (98%)	4 (2%)	50	70
10	I	179/180 (99%)	167 (93%)	12 (7%)	16	41
11	J	160/168 (95%)	150 (94%)	10 (6%)	18	43
12	K	85/136 (62%)	82 (96%)	3 (4%)	36	59
13	L	133/142 (94%)	131 (98%)	2 (2%)	65	80
14	M	102/108 (94%)	97 (95%)	5 (5%)	25	50
15	N	130/131 (99%)	128 (98%)	2 (2%)	65	80
16	O	107/119 (90%)	100 (94%)	7 (6%)	17	42
17	P	107/130 (82%)	102 (95%)	5 (5%)	26	51
18	Q	115/121 (95%)	111 (96%)	4 (4%)	36	59
19	R	99/122 (81%)	94 (95%)	5 (5%)	24	48
20	S	123/132 (93%)	114 (93%)	9 (7%)	14	39
21	T	113/115 (98%)	106 (94%)	7 (6%)	18	43
22	U	93/107 (87%)	89 (96%)	4 (4%)	29	53
23	V	67/67 (100%)	66 (98%)	1 (2%)	65	80
24	W	112/113 (99%)	107 (96%)	5 (4%)	27	52
25	X	108/115 (94%)	103 (95%)	5 (5%)	27	52
26	Y	107/115 (93%)	101 (94%)	6 (6%)	21	46
27	Z	67/103 (65%)	63 (94%)	4 (6%)	19	44
28	a	83/98 (85%)	76 (92%)	7 (8%)	11	33
29	b	72/76 (95%)	68 (94%)	4 (6%)	21	46
30	c	55/62 (89%)	52 (94%)	3 (6%)	21	47
31	d	47/49 (96%)	43 (92%)	4 (8%)	10	33
32	e	42/48 (88%)	40 (95%)	2 (5%)	25	51
33	f	54/140 (39%)	51 (94%)	3 (6%)	21	46

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
34	g	272/275 (99%)	260 (96%)	12 (4%)	28	53
35	h	376/376 (100%)	368 (98%)	8 (2%)	53	72
36	i	371/371 (100%)	364 (98%)	7 (2%)	57	75
All	All	4868/5407 (90%)	4660 (96%)	208 (4%)	33	53

All (208) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	A	8	LEU
2	A	10	MET
2	A	19	LEU
2	A	110	ASN
2	A	204	TYR
3	B	23	ASP
3	B	30	TRP
3	B	46	LYS
3	B	71	LEU
3	B	97	LEU
3	B	131	ASP
3	B	148	ASN
3	B	152	LYS
3	B	177	GLN
3	B	216	LYS
3	B	218	LEU
4	C	89	LYS
4	C	137	VAL
4	C	205	VAL
4	C	209	VAL
4	C	240	THR
4	C	252	THR
4	C	256	TRP
5	D	5	ILE
5	D	16	ILE
5	D	42	THR
5	D	66	ILE
5	D	93	THR
5	D	150	MET
5	D	162	ASP
5	D	193	ASP
5	D	211	VAL
6	E	23	LEU

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Mol	Chain	Res	Type
6	E	37	LYS
6	E	51	ARG
6	E	95	THR
6	E	114	ILE
6	E	115	THR
6	E	128	LYS
6	E	136	ILE
6	E	148	ARG
6	E	166	THR
6	E	189	LEU
6	E	205	PHE
7	F	47	LYS
7	F	63	LYS
7	F	68	ILE
7	F	72	LEU
7	F	103	LEU
7	F	135	ARG
7	F	195	GLU
8	G	24	LEU
8	G	29	GLU
8	G	34	THR
8	G	87	ARG
8	G	160	LYS
8	G	176	ILE
8	G	195	LYS
9	H	111	LYS
9	H	116	ARG
9	H	118	ARG
9	H	152	ARG
10	I	19	LYS
10	I	21	TYR
10	I	29	LEU
10	I	48	VAL
10	I	55	TYR
10	I	62	VAL
10	I	78	ILE
10	I	93	THR
10	I	131	PRO
10	I	136	ILE
10	I	137	LEU
10	I	144	LYS
11	J	8	VAL

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Mol	Chain	Res	Type
11	J	12	THR
11	J	30	LYS
11	J	41	ARG
11	J	47	LYS
11	J	78	LEU
11	J	128	VAL
11	J	130	ILE
11	J	147	PHE
11	J	163	SER
12	K	15	LEU
12	K	70	TYR
12	K	84	HIS
13	L	17	PHE
13	L	69	ARG
14	M	52	LEU
14	M	83	LYS
14	M	88	TRP
14	M	106	CYS
14	M	117	GLU
15	N	7	PRO
15	N	80	LEU
16	O	45	THR
16	O	63	LYS
16	O	100	THR
16	O	105	THR
16	O	129	ILE
16	O	132	VAL
16	O	140	THR
17	P	16	THR
17	P	29	SER
17	P	40	ARG
17	P	44	ARG
17	P	74	GLU
18	Q	39	LEU
18	Q	43	GLU
18	Q	72	VAL
18	Q	105	LYS
19	R	22	THR
19	R	46	LEU
19	R	71	ILE
19	R	109	LEU
19	R	118	GLN

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Mol	Chain	Res	Type
20	S	3	LEU
20	S	5	ILE
20	S	8	LYS
20	S	23	ARG
20	S	25	LYS
20	S	45	LEU
20	S	60	THR
20	S	99	LEU
20	S	139	THR
21	T	5	THR
21	T	33	TRP
21	T	39	LEU
21	T	64	LEU
21	T	87	VAL
21	T	121	ARG
21	T	126	GLN
22	U	24	LEU
22	U	59	LYS
22	U	61	LEU
22	U	115	THR
23	V	2	GLN
24	W	4	MET
24	W	11	LEU
24	W	20	ARG
24	W	97	ARG
24	W	98	GLN
25	X	17	ARG
25	X	31	HIS
25	X	37	LYS
25	X	80	LYS
25	X	81	ILE
26	Y	20	ARG
26	Y	21	LYS
26	Y	54	VAL
26	Y	84	LYS
26	Y	99	LYS
26	Y	100	LYS
27	Z	43	LYS
27	Z	62	VAL
27	Z	67	LEU
27	Z	111	ARG
28	a	21	ILE

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Mol	Chain	Res	Type
28	a	23	CYS
28	a	32	LYS
28	a	37	LYS
28	a	64	LEU
28	a	71	LEU
28	a	84	VAL
29	b	7	LEU
29	b	56	CYS
29	b	59	CYS
29	b	63	LEU
30	c	9	ILE
30	c	17	VAL
30	c	32	VAL
31	d	28	HIS
31	d	40	ARG
31	d	44	ARG
31	d	48	LYS
32	e	18	LYS
32	e	46	VAL
33	f	97	LYS
33	f	104	LYS
33	f	148	TYR
34	g	20	GLN
34	g	26	GLN
34	g	54	ILE
34	g	94	THR
34	g	99	ARG
34	g	157	SER
34	g	164	ILE
34	g	189	ILE
34	g	255	SER
34	g	266	ILE
34	g	287	THR
34	g	289	LEU
35	h	30	ASN
35	h	44	GLN
35	h	140	LEU
35	h	226	LEU
35	h	278	VAL
35	h	302	CYS
35	h	333	LEU
35	h	342	LYS

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Mol	Chain	Res	Type
36	i	227	THR
36	i	256	LEU
36	i	330	ARG
36	i	414	ILE
36	i	444	THR
36	i	534	ILE
36	i	602	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (100) such sidechains are listed below:

Mol	Chain	Res	Type
2	A	50	ASN
2	A	110	ASN
2	A	215	GLN
3	B	40	ASN
3	B	53	GLN
3	B	149	GLN
3	B	157	GLN
3	B	160	GLN
3	B	177	GLN
4	C	267	GLN
5	D	4	GLN
5	D	56	GLN
5	D	57	ASN
5	D	101	GLN
5	D	179	GLN
6	E	36	HIS
6	E	138	HIS
6	E	188	ASN
6	E	216	ASN
6	E	230	ASN
7	F	29	GLN
7	F	82	ASN
7	F	95	HIS
7	F	107	ASN
7	F	110	GLN
7	F	114	ASN
7	F	165	ASN
7	F	203	ASN
8	G	65	GLN
8	G	81	HIS
8	G	105	ASN

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Mol	Chain	Res	Type
9	H	25	GLN
9	H	76	GLN
9	H	97	GLN
9	H	112	ASN
10	I	22	HIS
11	J	124	HIS
11	J	143	ASN
12	K	44	HIS
12	K	84	HIS
13	L	5	GLN
13	L	112	HIS
14	M	19	GLN
15	N	105	ASN
16	O	32	HIS
16	O	43	HIS
17	P	35	GLN
17	P	104	GLN
18	Q	11	GLN
18	Q	48	GLN
18	Q	80	GLN
18	Q	86	GLN
19	R	62	GLN
20	S	19	ASN
20	S	73	ASN
20	S	85	ASN
20	S	87	GLN
21	T	63	HIS
21	T	126	GLN
22	U	100	GLN
23	V	2	GLN
24	W	24	GLN
24	W	82	GLN
24	W	113	HIS
25	X	61	GLN
25	X	73	GLN
25	X	77	ASN
26	Y	19	GLN
26	Y	22	GLN
26	Y	29	HIS
27	Z	103	HIS
28	a	19	GLN
29	b	49	HIS

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Mol	Chain	Res	Type
30	c	45	ASN
31	d	5	GLN
31	d	16	GLN
31	d	26	ASN
31	d	41	GLN
32	e	22	GLN
32	e	44	ASN
34	g	20	GLN
34	g	26	GLN
34	g	56	GLN
34	g	64	HIS
34	g	117	ASN
34	g	196	ASN
35	h	44	GLN
35	h	79	GLN
35	h	111	ASN
35	h	121	ASN
35	h	164	ASN
35	h	199	HIS
35	h	266	GLN
35	h	397	GLN
35	h	425	GLN
36	i	291	HIS
36	i	360	ASN
36	i	419	ASN
36	i	514	ASN
36	i	578	GLN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	1	1738/1869 (92%)	1037 (59%)	152 (8%)
37	j	195/201 (97%)	50 (25%)	0
All	All	1933/2070 (93%)	1087 (56%)	152 (7%)

All (1087) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	1	2	A
1	1	3	C
1	1	4	C

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Mol	Chain	Res	Type
1	1	5	U
1	1	6	G
1	1	7	G
1	1	8	U
1	1	9	U
1	1	15	U
1	1	16	G
1	1	17	C
1	1	21	U
1	1	22	A
1	1	24	C
1	1	25	A
1	1	26	U
1	1	30	C
1	1	33	G
1	1	39	A
1	1	40	A
1	1	41	G
1	1	44	U
1	1	45	A
1	1	46	A
1	1	47	G
1	1	48	C
1	1	50	A
1	1	55	U
1	1	56	G
1	1	59	U
1	1	60	A
1	1	61	A
1	1	62	G
1	1	63	U
1	1	64	A
1	1	65	C
1	1	66	G
1	1	67	C
1	1	68	A
1	1	69	C
1	1	70	G
1	1	71	G
1	1	72	C
1	1	74	G
1	1	75	G

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Mol	Chain	Res	Type
1	1	76	U
1	1	77	A
1	1	78	C
1	1	79	A
1	1	80	G
1	1	81	U
1	1	82	G
1	1	83	A
1	1	84	A
1	1	87	U
1	1	98	C
1	1	99	A
1	1	101	U
1	1	103	A
1	1	104	A
1	1	105	U
1	1	106	C
1	1	109	U
1	1	110	U
1	1	111	A
1	1	112	U
1	1	113	G
1	1	114	G
1	1	115	U
1	1	116	U
1	1	117	C
1	1	118	C
1	1	120	U
1	1	121	U
1	1	122	G
1	1	123	G
1	1	124	U
1	1	125	C
1	1	126	G
1	1	127	C
1	1	128	U
1	1	129	C
1	1	130	G
1	1	131	C
1	1	132	U
1	1	133	C
1	1	134	C

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Mol	Chain	Res	Type
1	1	135	U
1	1	136	C
1	1	137	U
1	1	138	C
1	1	139	C
1	1	140	C
1	1	141	A
1	1	142	C
1	1	143	U
1	1	144	U
1	1	145	G
1	1	146	G
1	1	147	A
1	1	150	A
1	1	151	C
1	1	152	U
1	1	153	G
1	1	158	A
1	1	160	U
1	1	161	U
1	1	162	C
1	1	163	U
1	1	164	A
1	1	166	A
1	1	167	G
1	1	168	C
1	1	169	U
1	1	171	A
1	1	173	A
1	1	174	C
1	1	176	U
1	1	179	C
1	1	180	G
1	1	181	A
1	1	182	C
1	1	183	G
1	1	184	G
1	1	185	G
1	1	187	G
1	1	193	C
1	1	198	U
1	1	199	C

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Mol	Chain	Res	Type
1	1	200	G
1	1	201	C
1	1	202	G
1	1	204	G
1	1	205	G
1	1	207	G
1	1	208	G
1	1	209	A
1	1	210	U
1	1	211	G
1	1	213	G
1	1	214	U
1	1	215	G
1	1	216	C
1	1	217	A
1	1	218	U
1	1	219	U
1	1	220	U
1	1	225	G
1	1	226	A
1	1	227	U
1	1	228	C
1	1	229	A
1	1	230	A
1	1	233	C
1	1	234	C
1	1	235	A
1	1	236	A
1	1	237	C
1	1	238	C
1	1	239	C
1	1	298	G
1	1	301	A
1	1	303	C
1	1	304	C
1	1	305	U
1	1	306	C
1	1	307	G
1	1	308	G
1	1	309	G
1	1	310	C
1	1	311	C

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Mol	Chain	Res	Type
1	1	312	G
1	1	313	A
1	1	314	U
1	1	315	C
1	1	317	C
1	1	318	A
1	1	319	C
1	1	320	G
1	1	321	C
1	1	327	G
1	1	328	U
1	1	329	G
1	1	330	G
1	1	332	G
1	1	333	G
1	1	337	C
1	1	338	G
1	1	339	A
1	1	343	A
1	1	344	U
1	1	345	U
1	1	346	C
1	1	347	G
1	1	350	C
1	1	352	U
1	1	353	C
1	1	354	U
1	1	356	C
1	1	357	C
1	1	358	C
1	1	359	U
1	1	362	C
1	1	363	A
1	1	364	A
1	1	368	U
1	1	369	C
1	1	371	A
1	1	372	U
1	1	375	U
1	1	376	A
1	1	378	U
1	1	379	C

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Mol	Chain	Res	Type
1	1	380	G
1	1	381	C
1	1	382	C
1	1	383	G
1	1	384	U
1	1	386	C
1	1	389	A
1	1	395	G
1	1	399	C
1	1	400	C
1	1	407	G
1	1	408	A
1	1	409	C
1	1	410	G
1	1	412	G
1	1	416	U
1	1	421	G
1	1	422	U
1	1	423	U
1	1	424	C
1	1	426	A
1	1	427	U
1	1	429	C
1	1	431	G
1	1	433	A
1	1	435	A
1	1	436	G
1	1	438	G
1	1	440	G
1	1	441	C
1	1	442	C
1	1	443	U
1	1	445	A
1	1	447	A
1	1	448	A
1	1	449	A
1	1	450	C
1	1	451	G
1	1	452	G
1	1	454	U
1	1	459	C
1	1	460	A

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Mol	Chain	Res	Type
1	1	463	C
1	1	464	A
1	1	465	A
1	1	466	G
1	1	467	G
1	1	468	A
1	1	472	C
1	1	473	A
1	1	474	G
1	1	475	C
1	1	476	A
1	1	477	G
1	1	480	G
1	1	482	G
1	1	485	A
1	1	487	U
1	1	488	U
1	1	489	A
1	1	491	C
1	1	492	C
1	1	493	A
1	1	495	U
1	1	496	C
1	1	497	C
1	1	499	G
1	1	500	A
1	1	501	C
1	1	502	C
1	1	503	C
1	1	504	G
1	1	506	G
1	1	507	G
1	1	509	G
1	1	510	G
1	1	512	A
1	1	516	A
1	1	517	C
1	1	518	G
1	1	523	A
1	1	525	A
1	1	526	A
1	1	527	C

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Mol	Chain	Res	Type
1	1	529	A
1	1	530	U
1	1	533	A
1	1	535	G
1	1	536	A
1	1	537	C
1	1	538	U
1	1	539	C
1	1	541	U
1	1	542	U
1	1	543	C
1	1	544	G
1	1	545	A
1	1	546	G
1	1	547	G
1	1	548	C
1	1	549	C
1	1	550	C
1	1	553	U
1	1	554	A
1	1	555	A
1	1	559	G
1	1	560	A
1	1	562	U
1	1	564	A
1	1	565	G
1	1	566	U
1	1	568	C
1	1	570	C
1	1	571	U
1	1	572	U
1	1	573	U
1	1	574	A
1	1	575	A
1	1	576	A
1	1	577	U
1	1	578	C
1	1	579	C
1	1	580	U
1	1	582	U
1	1	586	G
1	1	587	A

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Mol	Chain	Res	Type
1	1	588	G
1	1	589	G
1	1	590	A
1	1	591	U
1	1	592	C
1	1	593	C
1	1	594	A
1	1	595	U
1	1	596	U
1	1	597	G
1	1	599	A
1	1	600	G
1	1	603	C
1	1	604	A
1	1	605	A
1	1	606	G
1	1	607	U
1	1	608	C
1	1	609	U
1	1	612	U
1	1	613	G
1	1	614	C
1	1	617	G
1	1	619	A
1	1	620	G
1	1	621	C
1	1	623	G
1	1	624	C
1	1	627	U
1	1	628	A
1	1	629	A
1	1	630	U
1	1	631	U
1	1	634	A
1	1	638	C
1	1	643	A
1	1	644	G
1	1	645	C
1	1	647	U
1	1	648	A
1	1	650	A
1	1	651	U

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Mol	Chain	Res	Type
1	1	652	U
1	1	654	A
1	1	655	A
1	1	656	G
1	1	657	U
1	1	658	U
1	1	659	G
1	1	660	C
1	1	661	U
1	1	663	C
1	1	664	A
1	1	665	G
1	1	666	U
1	1	668	A
1	1	669	A
1	1	671	A
1	1	672	A
1	1	673	G
1	1	674	C
1	1	675	U
1	1	676	C
1	1	677	G
1	1	679	A
1	1	680	G
1	1	681	U
1	1	683	G
1	1	684	G
1	1	686	U
1	1	688	U
1	1	689	U
1	1	692	G
1	1	694	G
1	1	695	C
1	1	742	U
1	1	743	U
1	1	744	G
1	1	745	C
1	1	746	C
1	1	747	U
1	1	748	C
1	1	749	U
1	1	750	C

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Mol	Chain	Res	Type
1	1	754	G
1	1	755	C
1	1	793	G
1	1	795	A
1	1	796	G
1	1	797	C
1	1	798	G
1	1	799	U
1	1	800	U
1	1	801	U
1	1	802	A
1	1	803	C
1	1	804	U
1	1	807	G
1	1	810	A
1	1	812	A
1	1	815	U
1	1	816	A
1	1	818	A
1	1	819	G
1	1	820	U
1	1	821	G
1	1	822	U
1	1	823	U
1	1	825	A
1	1	827	A
1	1	829	C
1	1	830	A
1	1	831	G
1	1	834	C
1	1	835	C
1	1	837	A
1	1	838	G
1	1	839	C
1	1	840	C
1	1	841	G
1	1	842	C
1	1	844	U
1	1	845	G
1	1	847	A
1	1	848	U
1	1	851	C

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Mol	Chain	Res	Type
1	1	852	G
1	1	856	C
1	1	861	A
1	1	862	A
1	1	863	U
1	1	865	A
1	1	869	A
1	1	870	A
1	1	873	G
1	1	874	G
1	1	875	A
1	1	876	C
1	1	886	A
1	1	887	U
1	1	888	U
1	1	889	U
1	1	890	U
1	1	891	G
1	1	896	U
1	1	897	U
1	1	898	U
1	1	899	U
1	1	900	C
1	1	911	C
1	1	912	C
1	1	913	A
1	1	914	U
1	1	915	G
1	1	917	U
1	1	918	U
1	1	919	A
1	1	920	A
1	1	921	G
1	1	924	G
1	1	930	C
1	1	933	G
1	1	937	C
1	1	938	A
1	1	943	U
1	1	946	U
1	1	950	C
1	1	951	C

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Mol	Chain	Res	Type
1	1	953	C
1	1	955	A
1	1	956	G
1	1	957	A
1	1	958	G
1	1	959	G
1	1	960	U
1	1	961	G
1	1	962	A
1	1	963	A
1	1	966	U
1	1	967	C
1	1	968	U
1	1	969	U
1	1	970	G
1	1	971	G
1	1	972	A
1	1	975	G
1	1	977	C
1	1	979	C
1	1	980	A
1	1	984	C
1	1	985	G
1	1	988	C
1	1	990	A
1	1	991	G
1	1	995	G
1	1	999	G
1	1	1000	C
1	1	1004	U
1	1	1006	C
1	1	1007	C
1	1	1009	A
1	1	1011	A
1	1	1015	U
1	1	1016	U
1	1	1017	U
1	1	1018	U
1	1	1019	C
1	1	1020	A
1	1	1021	U
1	1	1022	U

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Mol	Chain	Res	Type
1	1	1023	A
1	1	1024	A
1	1	1029	G
1	1	1033	G
1	1	1034	A
1	1	1035	A
1	1	1036	A
1	1	1040	G
1	1	1044	G
1	1	1045	U
1	1	1049	A
1	1	1050	A
1	1	1051	G
1	1	1052	A
1	1	1053	C
1	1	1055	A
1	1	1057	C
1	1	1058	A
1	1	1060	A
1	1	1061	U
1	1	1062	A
1	1	1064	C
1	1	1065	G
1	1	1067	C
1	1	1076	G
1	1	1083	A
1	1	1084	A
1	1	1085	C
1	1	1086	G
1	1	1087	A
1	1	1088	U
1	1	1089	G
1	1	1090	C
1	1	1096	G
1	1	1097	G
1	1	1101	U
1	1	1104	G
1	1	1108	G
1	1	1109	C
1	1	1110	G
1	1	1112	U
1	1	1115	U

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Mol	Chain	Res	Type
1	1	1116	C
1	1	1117	C
1	1	1118	C
1	1	1120	U
1	1	1121	G
1	1	1124	C
1	1	1131	G
1	1	1132	C
1	1	1133	A
1	1	1136	U
1	1	1137	U
1	1	1139	C
1	1	1140	G
1	1	1141	G
1	1	1143	A
1	1	1144	A
1	1	1147	C
1	1	1148	A
1	1	1149	A
1	1	1150	A
1	1	1151	G
1	1	1153	C
1	1	1154	U
1	1	1155	U
1	1	1157	G
1	1	1158	G
1	1	1161	U
1	1	1163	C
1	1	1164	G
1	1	1165	G
1	1	1166	G
1	1	1169	G
1	1	1170	A
1	1	1171	G
1	1	1176	G
1	1	1182	A
1	1	1183	A
1	1	1186	U
1	1	1189	A
1	1	1194	A
1	1	1195	A
1	1	1198	G

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Mol	Chain	Res	Type
1	1	1199	A
1	1	1200	A
1	1	1203	G
1	1	1205	C
1	1	1206	G
1	1	1207	G
1	1	1215	C
1	1	1216	C
1	1	1217	A
1	1	1218	C
1	1	1219	C
1	1	1221	G
1	1	1223	A
1	1	1224	G
1	1	1235	G
1	1	1236	G
1	1	1237	C
1	1	1242	U
1	1	1243	U
1	1	1245	G
1	1	1246	A
1	1	1247	C
1	1	1248	U
1	1	1249	C
1	1	1251	A
1	1	1253	A
1	1	1254	C
1	1	1255	G
1	1	1256	G
1	1	1257	G
1	1	1258	A
1	1	1259	A
1	1	1260	A
1	1	1261	C
1	1	1262	C
1	1	1263	U
1	1	1264	C
1	1	1265	A
1	1	1266	C
1	1	1267	C
1	1	1268	C
1	1	1269	G

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Mol	Chain	Res	Type
1	1	1270	G
1	1	1273	C
1	1	1274	G
1	1	1275	G
1	1	1276	A
1	1	1277	C
1	1	1278	A
1	1	1279	C
1	1	1282	A
1	1	1284	A
1	1	1285	G
1	1	1286	G
1	1	1287	A
1	1	1288	U
1	1	1289	U
1	1	1297	U
1	1	1300	U
1	1	1301	A
1	1	1302	G
1	1	1303	C
1	1	1307	U
1	1	1308	U
1	1	1310	U
1	1	1311	C
1	1	1312	G
1	1	1313	A
1	1	1314	U
1	1	1315	U
1	1	1317	C
1	1	1318	G
1	1	1323	U
1	1	1324	G
1	1	1325	G
1	1	1326	U
1	1	1327	G
1	1	1330	G
1	1	1331	C
1	1	1332	A
1	1	1333	U
1	1	1335	G
1	1	1343	U
1	1	1344	A

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Mol	Chain	Res	Type
1	1	1345	G
1	1	1347	U
1	1	1349	G
1	1	1351	G
1	1	1352	G
1	1	1354	G
1	1	1357	A
1	1	1358	U
1	1	1359	U
1	1	1360	U
1	1	1363	C
1	1	1364	U
1	1	1368	U
1	1	1369	A
1	1	1371	U
1	1	1372	U
1	1	1378	A
1	1	1381	G
1	1	1382	A
1	1	1384	C
1	1	1389	C
1	1	1390	U
1	1	1392	U
1	1	1393	G
1	1	1394	G
1	1	1395	C
1	1	1397	U
1	1	1399	C
1	1	1401	A
1	1	1402	A
1	1	1403	C
1	1	1404	U
1	1	1405	A
1	1	1406	G
1	1	1407	U
1	1	1408	U
1	1	1409	A
1	1	1410	C
1	1	1411	G
1	1	1412	C
1	1	1413	G
1	1	1415	C

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Mol	Chain	Res	Type
1	1	1416	C
1	1	1417	C
1	1	1419	C
1	1	1420	G
1	1	1421	A
1	1	1422	G
1	1	1423	C
1	1	1424	G
1	1	1425	G
1	1	1426	U
1	1	1427	C
1	1	1428	G
1	1	1429	G
1	1	1430	C
1	1	1431	G
1	1	1432	U
1	1	1433	C
1	1	1434	C
1	1	1435	C
1	1	1436	C
1	1	1437	C
1	1	1438	A
1	1	1440	C
1	1	1441	U
1	1	1442	U
1	1	1443	C
1	1	1444	U
1	1	1445	U
1	1	1446	A
1	1	1447	G
1	1	1448	A
1	1	1451	G
1	1	1453	C
1	1	1454	A
1	1	1455	A
1	1	1456	G
1	1	1457	U
1	1	1461	G
1	1	1462	U
1	1	1463	U
1	1	1464	C
1	1	1465	A

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Mol	Chain	Res	Type
1	1	1466	G
1	1	1467	C
1	1	1471	C
1	1	1472	C
1	1	1473	G
1	1	1475	G
1	1	1476	A
1	1	1477	U
1	1	1478	U
1	1	1480	A
1	1	1481	G
1	1	1482	C
1	1	1484	A
1	1	1486	A
1	1	1489	A
1	1	1490	G
1	1	1493	C
1	1	1494	U
1	1	1495	G
1	1	1496	U
1	1	1498	A
1	1	1500	G
1	1	1505	U
1	1	1507	G
1	1	1508	A
1	1	1509	U
1	1	1510	G
1	1	1511	U
1	1	1513	C
1	1	1514	G
1	1	1517	G
1	1	1520	G
1	1	1521	C
1	1	1522	A
1	1	1523	C
1	1	1528	G
1	1	1529	C
1	1	1530	U
1	1	1531	A
1	1	1535	U
1	1	1536	G
1	1	1539	U

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Mol	Chain	Res	Type
1	1	1540	G
1	1	1541	G
1	1	1542	C
1	1	1543	U
1	1	1544	C
1	1	1545	A
1	1	1546	G
1	1	1547	C
1	1	1548	G
1	1	1549	U
1	1	1550	G
1	1	1551	U
1	1	1553	C
1	1	1554	C
1	1	1555	U
1	1	1556	A
1	1	1557	C
1	1	1558	C
1	1	1560	U
1	1	1561	A
1	1	1563	G
1	1	1568	C
1	1	1569	A
1	1	1570	G
1	1	1573	G
1	1	1574	C
1	1	1577	G
1	1	1578	U
1	1	1579	A
1	1	1580	A
1	1	1581	C
1	1	1582	C
1	1	1585	U
1	1	1586	U
1	1	1587	G
1	1	1588	A
1	1	1589	A
1	1	1591	C
1	1	1595	U
1	1	1597	C
1	1	1598	G
1	1	1599	U

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Mol	Chain	Res	Type
1	1	1600	G
1	1	1601	A
1	1	1602	U
1	1	1603	G
1	1	1604	G
1	1	1605	G
1	1	1607	A
1	1	1609	C
1	1	1610	G
1	1	1612	G
1	1	1614	A
1	1	1615	U
1	1	1617	G
1	1	1618	C
1	1	1620	A
1	1	1621	U
1	1	1622	U
1	1	1623	A
1	1	1624	U
1	1	1625	U
1	1	1627	C
1	1	1631	U
1	1	1632	G
1	1	1635	C
1	1	1636	G
1	1	1637	A
1	1	1638	G
1	1	1639	G
1	1	1640	A
1	1	1644	C
1	1	1645	C
1	1	1647	A
1	1	1648	G
1	1	1649	U
1	1	1651	A
1	1	1652	G
1	1	1654	G
1	1	1655	C
1	1	1656	G
1	1	1660	C
1	1	1661	A
1	1	1662	U

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Mol	Chain	Res	Type
1	1	1664	A
1	1	1665	G
1	1	1666	C
1	1	1669	G
1	1	1671	G
1	1	1672	U
1	1	1673	U
1	1	1674	G
1	1	1677	U
1	1	1678	A
1	1	1679	A
1	1	1680	G
1	1	1682	C
1	1	1684	C
1	1	1685	U
1	1	1686	G
1	1	1687	C
1	1	1688	C
1	1	1689	C
1	1	1691	U
1	1	1692	U
1	1	1694	U
1	1	1696	C
1	1	1697	A
1	1	1698	C
1	1	1699	A
1	1	1700	C
1	1	1701	C
1	1	1702	G
1	1	1703	C
1	1	1707	U
1	1	1708	C
1	1	1709	G
1	1	1710	C
1	1	1714	U
1	1	1719	A
1	1	1720	U
1	1	1721	U
1	1	1722	G
1	1	1723	G
1	1	1728	U
1	1	1729	U

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Mol	Chain	Res	Type
1	1	1731	A
1	1	1732	G
1	1	1735	A
1	1	1744	G
1	1	1745	A
1	1	1747	C
1	1	1749	G
1	1	1751	C
1	1	1752	C
1	1	1760	G
1	1	1761	U
1	1	1764	G
1	1	1765	C
1	1	1767	C
1	1	1768	A
1	1	1770	G
1	1	1775	C
1	1	1781	A
1	1	1782	G
1	1	1783	C
1	1	1788	A
1	1	1789	G
1	1	1790	A
1	1	1792	G
1	1	1794	C
1	1	1798	C
1	1	1800	A
1	1	1809	A
1	1	1811	C
1	1	1813	A
1	1	1817	G
1	1	1819	A
1	1	1823	A
1	1	1824	A
1	1	1825	A
1	1	1826	G
1	1	1827	U
1	1	1829	G
1	1	1831	A
1	1	1832	A
1	1	1833	C
1	1	1834	A

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Mol	Chain	Res	Type
1	1	1835	A
1	1	1836	G
1	1	1837	G
1	1	1838	U
1	1	1839	U
1	1	1841	C
1	1	1843	G
1	1	1844	U
1	1	1846	G
1	1	1847	G
1	1	1849	G
1	1	1850	A
1	1	1851	A
1	1	1852	C
1	1	1856	C
1	1	1857	G
1	1	1860	A
1	1	1861	G
1	1	1862	G
1	1	1863	A
1	1	1864	U
1	1	1865	C
1	1	1866	A
1	1	1867	U
1	1	1868	U
1	1	1869	A
37	j	6032	A
37	j	6033	A
37	j	6036	G
37	j	6042	U
37	j	6043	U
37	j	6044	G
37	j	6053	U
37	j	6054	A
37	j	6061	U
37	j	6068	U
37	j	6069	U
37	j	6073	A
37	j	6084	A
37	j	6099	U
37	j	6101	U
37	j	6119	U

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Mol	Chain	Res	Type
37	j	6121	A
37	j	6123	G
37	j	6128	A
37	j	6129	G
37	j	6136	U
37	j	6138	G
37	j	6154	A
37	j	6158	A
37	j	6163	G
37	j	6164	C
37	j	6165	C
37	j	6167	U
37	j	6168	C
37	j	6172	G
37	j	6173	C
37	j	6174	G
37	j	6177	U
37	j	6179	U
37	j	6182	A
37	j	6203	U
37	j	6204	A
37	j	6206	G
37	j	6207	A
37	j	6210	U
37	j	6211	U
37	j	6217	U
37	j	6219	A
37	j	6220	G
37	j	6223	U
37	j	6226	C
37	j	6227	U
37	j	6228	C
37	j	6229	G
37	j	6230	A

All (152) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	1	24	C
1	1	44	U
1	1	61	A
1	1	64	A

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Mol	Chain	Res	Type
1	1	66	G
1	1	68	A
1	1	77	A
1	1	78	C
1	1	102	A
1	1	111	A
1	1	113	G
1	1	124	U
1	1	131	C
1	1	136	C
1	1	139	C
1	1	140	C
1	1	147	A
1	1	162	C
1	1	181	A
1	1	183	G
1	1	199	C
1	1	200	G
1	1	207	G
1	1	209	A
1	1	227	U
1	1	304	C
1	1	307	G
1	1	308	G
1	1	310	C
1	1	312	G
1	1	317	C
1	1	319	C
1	1	332	G
1	1	338	G
1	1	356	C
1	1	363	A
1	1	368	U
1	1	370	G
1	1	383	G
1	1	399	C
1	1	428	U
1	1	448	A
1	1	465	A
1	1	475	C
1	1	486	A
1	1	487	U

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Mol	Chain	Res	Type
1	1	501	C
1	1	517	C
1	1	544	G
1	1	546	G
1	1	547	G
1	1	558	G
1	1	577	U
1	1	578	C
1	1	589	G
1	1	590	A
1	1	593	C
1	1	604	A
1	1	656	G
1	1	662	G
1	1	671	A
1	1	687	C
1	1	743	U
1	1	799	U
1	1	811	A
1	1	821	G
1	1	822	U
1	1	833	C
1	1	834	C
1	1	840	C
1	1	899	U
1	1	913	A
1	1	970	G
1	1	971	G
1	1	1015	U
1	1	1016	U
1	1	1020	A
1	1	1021	U
1	1	1043	G
1	1	1060	A
1	1	1088	U
1	1	1108	G
1	1	1114	U
1	1	1115	U
1	1	1138	C
1	1	1150	A
1	1	1164	G
1	1	1198	G

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Mol	Chain	Res	Type
1	1	1215	C
1	1	1242	U
1	1	1247	C
1	1	1250	A
1	1	1253	A
1	1	1257	G
1	1	1259	A
1	1	1261	C
1	1	1264	C
1	1	1277	C
1	1	1285	G
1	1	1301	A
1	1	1307	U
1	1	1308	U
1	1	1311	C
1	1	1313	A
1	1	1326	U
1	1	1342	U
1	1	1351	G
1	1	1362	U
1	1	1401	A
1	1	1404	U
1	1	1406	G
1	1	1411	G
1	1	1456	G
1	1	1476	A
1	1	1477	U
1	1	1494	U
1	1	1497	G
1	1	1508	A
1	1	1520	G
1	1	1534	C
1	1	1542	C
1	1	1543	U
1	1	1555	U
1	1	1556	A
1	1	1578	U
1	1	1586	U
1	1	1603	G
1	1	1624	U
1	1	1631	U
1	1	1635	C

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Mol	Chain	Res	Type
1	1	1637	A
1	1	1638	G
1	1	1644	C
1	1	1648	G
1	1	1654	G
1	1	1655	C
1	1	1673	U
1	1	1697	A
1	1	1698	C
1	1	1700	C
1	1	1721	U
1	1	1781	A
1	1	1823	A
1	1	1824	A
1	1	1830	U
1	1	1833	C
1	1	1834	A
1	1	1836	G
1	1	1848	U
1	1	1860	A
1	1	1862	G
1	1	1867	U

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 monosaccharides 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

The following chains have linkage breaks:

Mol	Chain	Number of breaks
37	j	10
36	i	5
35	h	3

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	j	6150:C	O3'	6151:A	P	11.37
1	j	6065:A	O3'	6066:G	P	10.23
1	j	6106:U	O3'	6107:A	P	9.31
1	j	6136:U	O3'	6137:A	P	8.47
1	i	325:LYS	C	326:GLY	N	5.91
1	i	386:HIS	C	387:PHE	N	5.15
1	h	371:SER	C	372:MET	N	4.74
1	h	214:ILE	C	215:SER	N	4.01
1	i	271:VAL	C	272:GLY	N	3.94
1	h	315:GLY	C	316:ALA	N	3.51
1	j	6073:A	O3'	6074:A	P	3.28
1	i	305:ALA	C	306:ASP	N	3.22
1	i	503:ILE	C	504:LEU	N	3.10
1	j	6229:G	O3'	6230:A	P	1.84
1	j	6206:G	O3'	6207:A	P	1.79
1	j	6198:A	O3'	6199:A	P	1.77
1	j	6177:U	O3'	6178:A	P	1.39
1	j	6173:C	O3'	6174:G	P	1.37

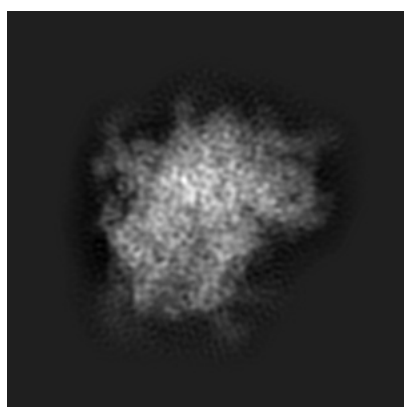
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-2813. These allow visual inspection of the internal detail of the map and identification of artifacts.

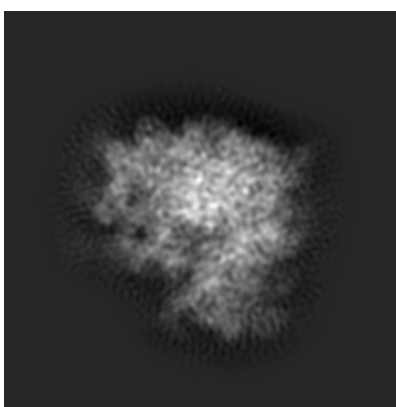
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

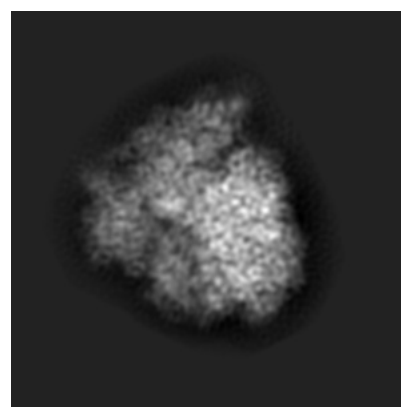
6.1.1 Primary map



X



Y

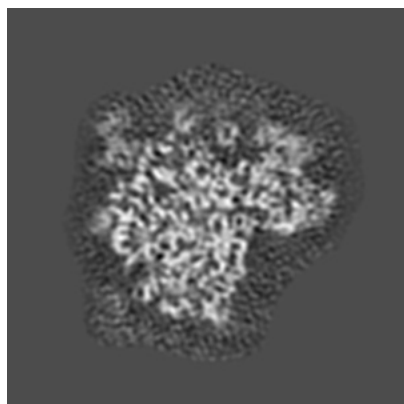


Z

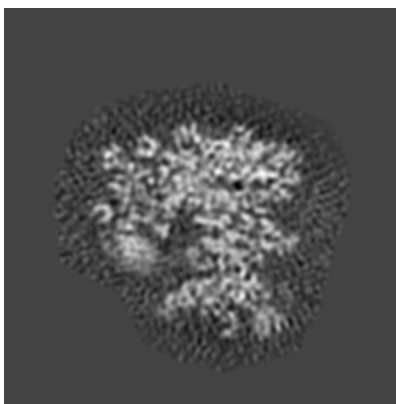
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

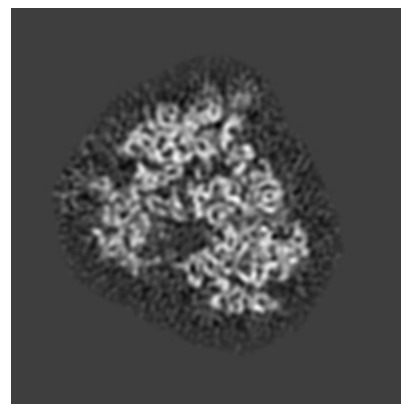
6.2.1 Primary map



X Index: 150



Y Index: 150

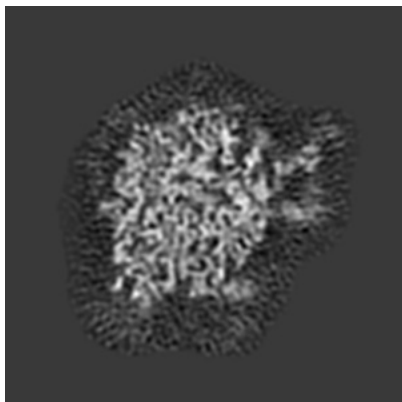


Z Index: 150

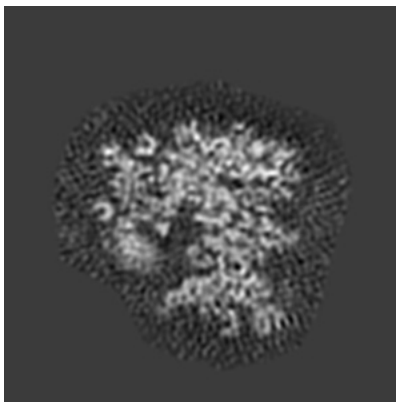
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

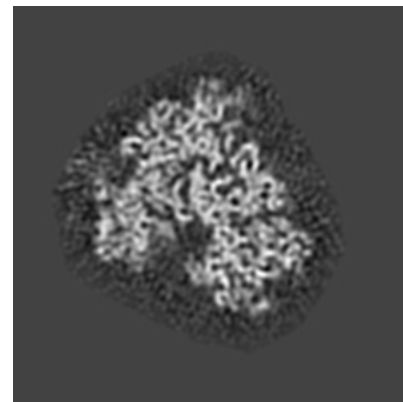
6.3.1 Primary map



X Index: 172



Y Index: 149



Z Index: 154

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

6.4 Orthogonal surface views [i](#)

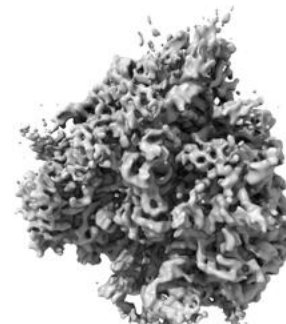
6.4.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 3.0. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

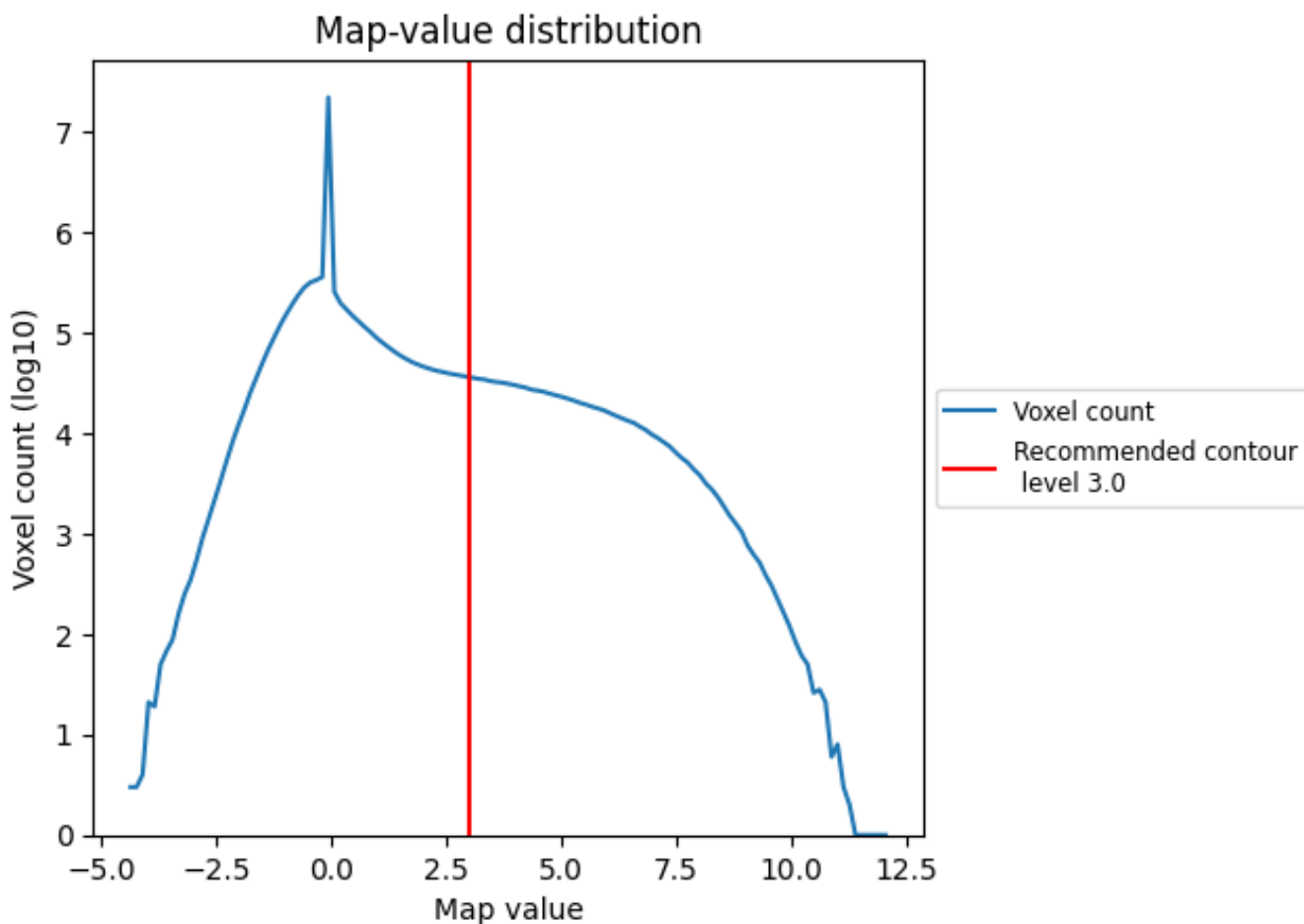
6.5 Mask visualisation

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

7 Map analysis [i](#)

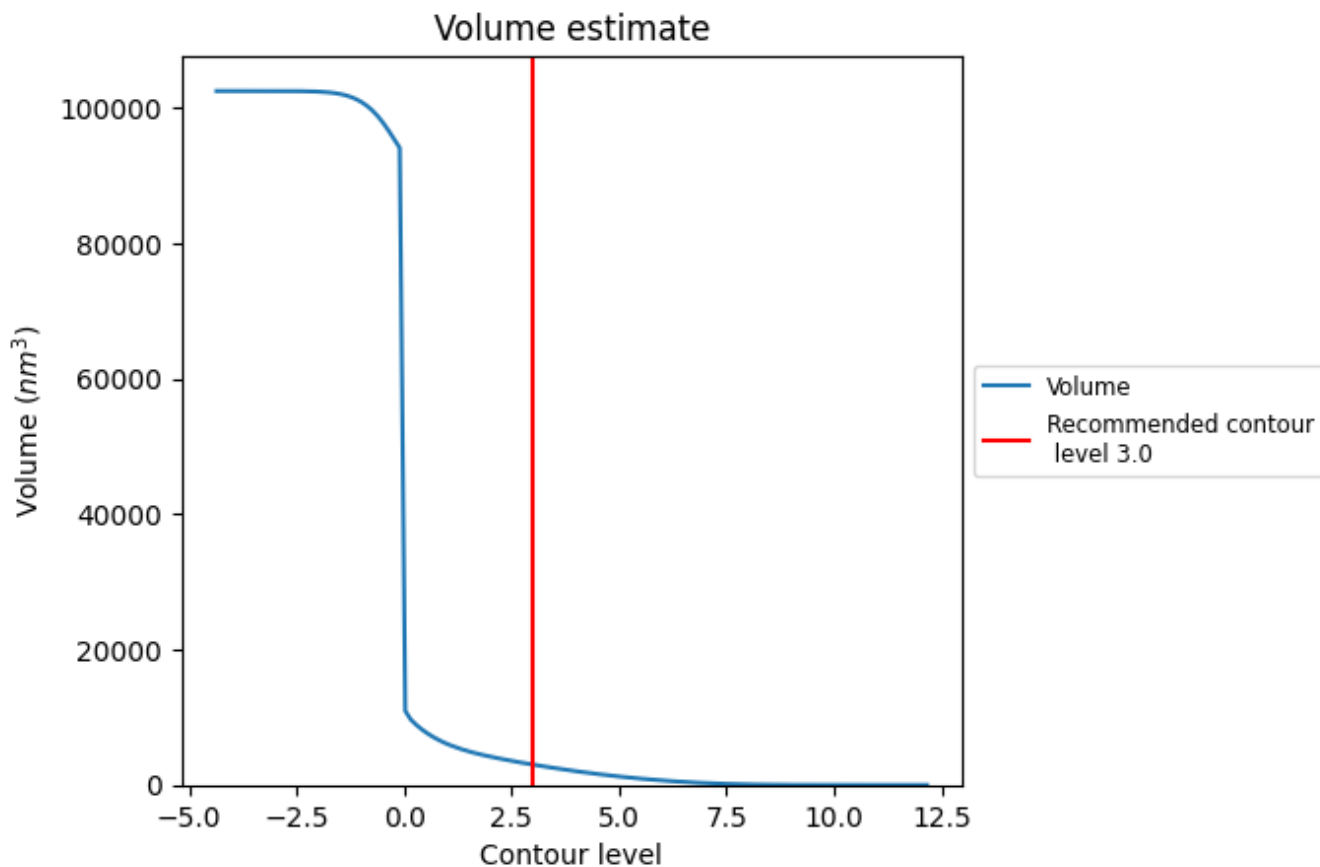
This section contains the results of statistical analysis of the map.

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.

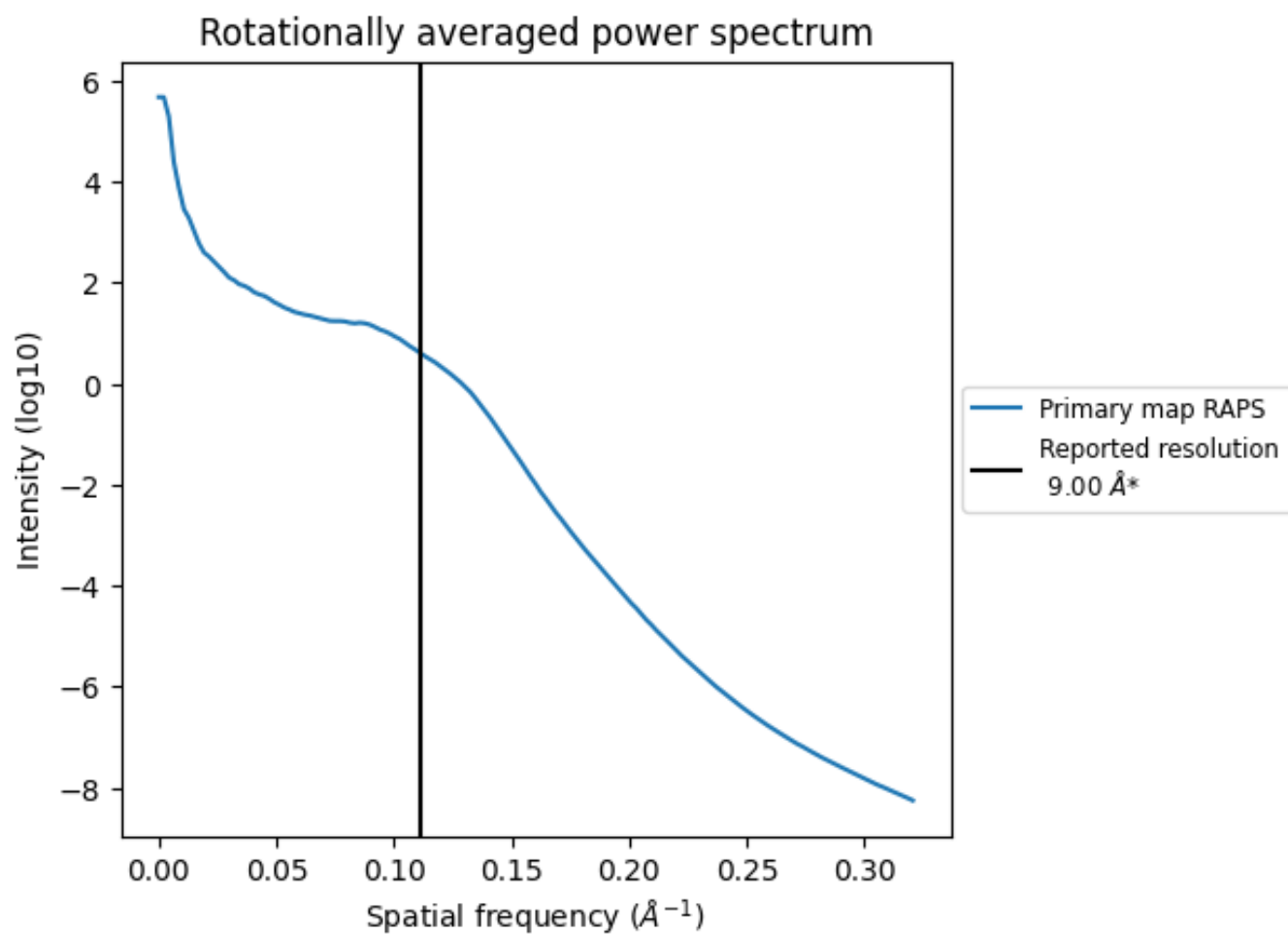
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 3001 nm^3 ; this corresponds to an approximate mass of 2711 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 i



*Reported resolution corresponds to spatial frequency of 0.111 Å⁻¹

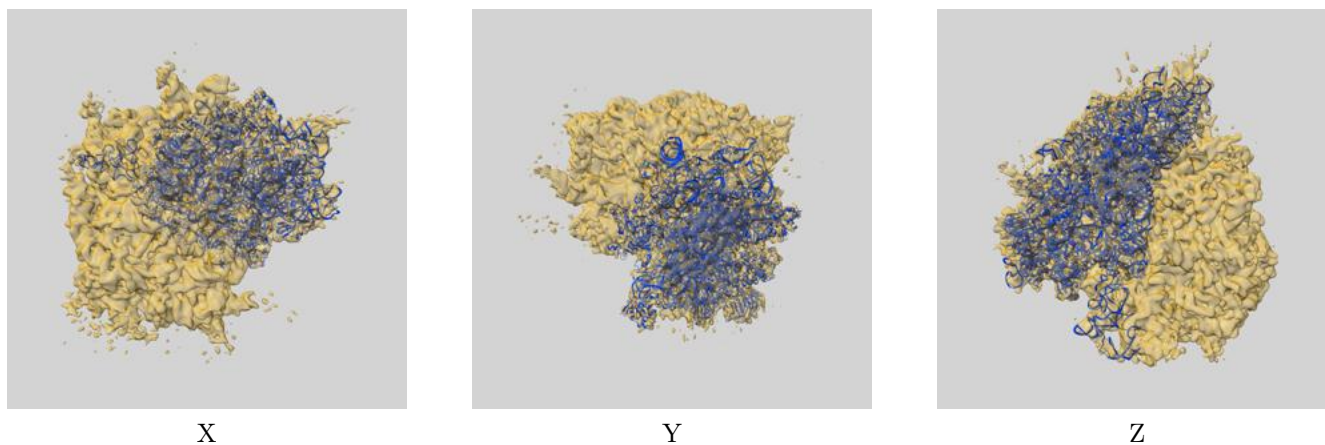
8 Fourier-Shell correlation

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

9 Map-model fit [i](#)

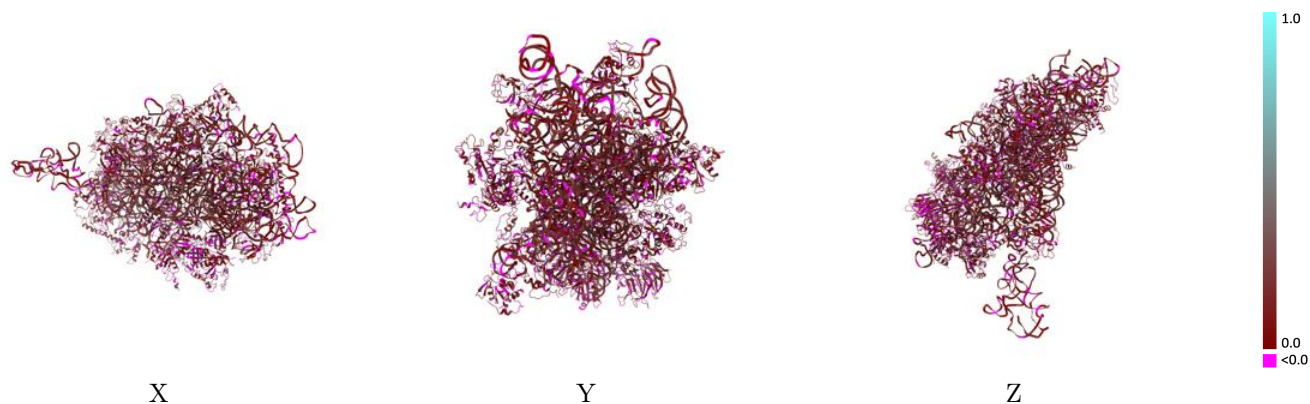
This section contains information regarding the fit between EMDB map EMD-2813 and PDB model 4D61. Per-residue inclusion information can be found in section 3 on page 11.

9.1 Map-model overlay [i](#)



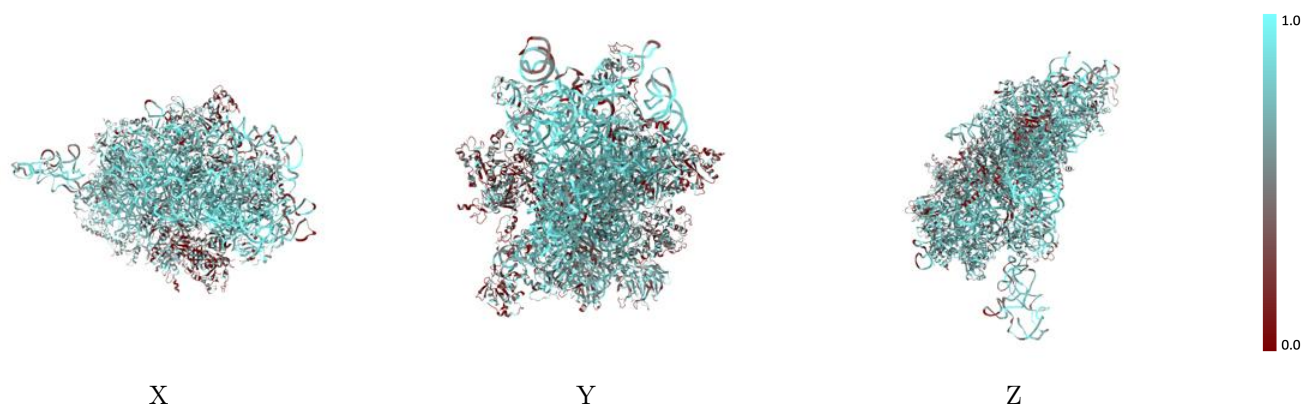
The images above show the 3D surface view of the map at the recommended contour level 3.0 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



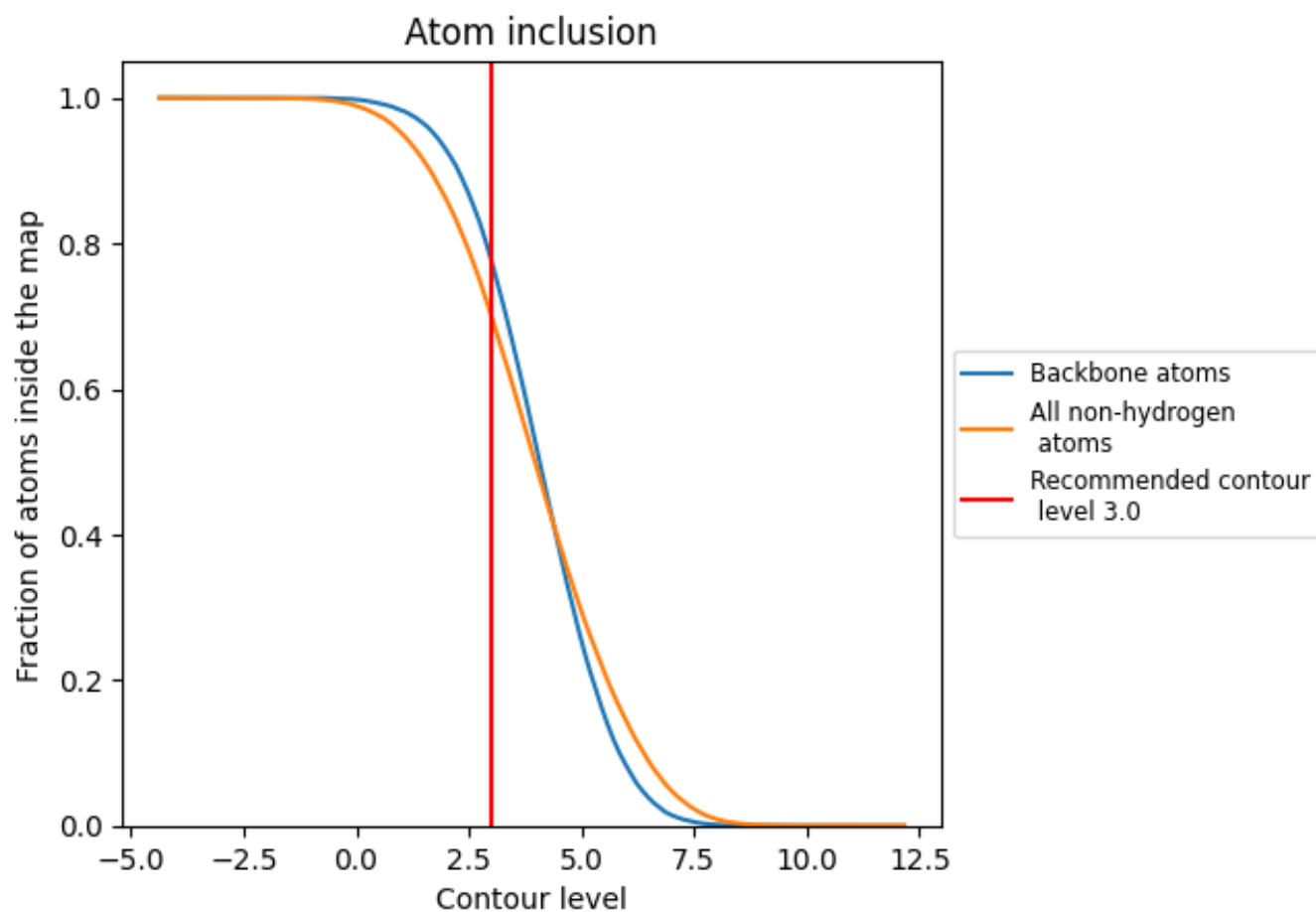
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (3.0).







































































9.4 Atom inclusion [i](#)



At the recommended contour level, 78% of all backbone atoms, 70% 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 (3.0) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.7002	 0.1270
1	 0.8652	 0.1580
A	 0.4654	 0.1120
B	 0.6698	 0.1340
C	 0.6099	 0.1280
D	 0.5852	 0.1170
E	 0.6687	 0.1090
F	 0.6284	 0.0970
G	 0.6601	 0.0980
H	 0.3619	 0.1000
I	 0.6253	 0.0930
J	 0.6794	 0.1080
K	 0.6365	 0.0860
L	 0.6040	 0.1150
M	 0.3293	 0.0670
N	 0.6080	 0.1130
O	 0.6439	 0.1060
P	 0.5920	 0.0850
Q	 0.6791	 0.0870
R	 0.4925	 0.0900
S	 0.6546	 0.1070
T	 0.6322	 0.0850
U	 0.5371	 0.0690
V	 0.4855	 0.1050
W	 0.6244	 0.1050
X	 0.6256	 0.1140
Y	 0.6204	 0.1000
Z	 0.6559	 0.1180
a	 0.6206	 0.0910
b	 0.6020	 0.1140
c	 0.5681	 0.1030
d	 0.7160	 0.0630
e	 0.5214	 0.1160
f	 0.3706	 0.0750
g	 0.5858	 0.0860



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Chain	Atom inclusion	Q-score
h	 0.4202	 0.0970
i	 0.3540	 0.0920
j	 0.6869	 0.1270