Full wwPDB EM Validation Report ⓘ

Oct 13, 2024 – 05:58 am BST

PDB ID	:	5A2Q
EMDB ID	:	EMD-3019
Title	:	Structure of the HCV IRES bound to the human ribosome
Authors	:	Quade, N.; Leiundgut, M.; Boehringer, D.; Heuvel, J.v.d.; Ban, N.
Deposited on	:	2015-05-21
Resolution	:	3.90 Å(reported)
Based on initial model	:	4W23

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:

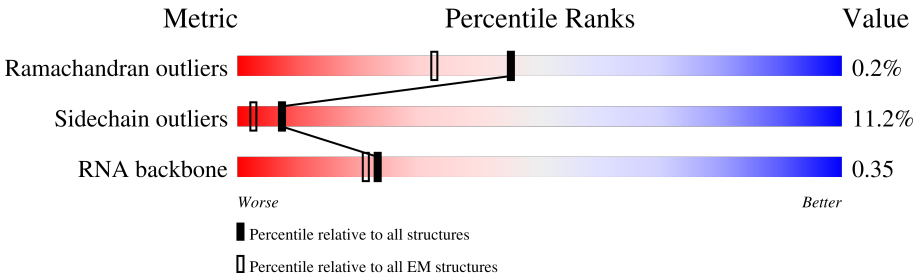
EMDB validation analysis	:	0.0.1.dev113
MolProbity	:	4.02b-467
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

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 3.90 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	207382	16835
Sidechain outliers	206894	16415
RNA backbone	6643	2191

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 <=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	2	1868	53% 31% 5% 11%
2	3	257	9% 40% 57%
3	A	295	66% 7% 27%
4	B	264	73% 7% 19%
5	C	293	58% 16% 26%
6	D	243	18% 87% 5% 7%
7	E	263	86% 13%
8	F	204	13% 87% 5% 7%

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Mol	Chain	Length	Quality of chain
9	G	249	84% 8% 8%
10	H	194	88% 8%
11	I	208	86% 12%
12	J	194	80% 12% 7%
13	K	165	19% 57% 42%
14	L	158	6% 76% 20%
15	M	132	48% 89% 7%
16	N	151	87% 12%
17	O	151	77% 12% 11%
18	P	145	22% 79% 17%
19	Q	146	12% 88% 7% 5%
20	R	135	10% 87% 10%
21	S	152	22% 90% 6%
22	T	146	16% 94% 5%
23	U	119	5% 80% 5% 15%
24	V	83	80% 19%
25	W	130	83% 16%
26	X	143	90% 8%
27	Y	130	85% 11% 5%
28	Z	125	10% 54% 42%
29	a	101	87% 13%
30	b	82	87% 13%
31	c	61	95% 5%
32	d	55	5% 95% 5%
33	e	56	12% 84% 16%

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Mol	Chain	Length	Quality of chain
34	f	72	64% 96%
35	g	315	23% 94% 6%
36	h	24	12% 88% 12%
37	r	13	8% 92% 8%
38	w	62	56% 97%

2 Entry composition (i)

There are 41 unique types of molecules in this entry. The entry contains 80749 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	2	1665	35552	15869	6385	11633	1665	0	0

- Molecule 2 is a RNA chain called HCV IRES.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	3	257	5485	2444	979	1805	257	0	0

- Molecule 3 is a protein called RIBOSOMAL PROTEIN US2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	A	216	1705	1083	299	315	8	0	0

- Molecule 4 is a protein called RIBOSOMAL PROTEIN ES1.

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

- Molecule 5 is a protein called RIBOSOMAL PROTEIN US5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	C	218	1690	1094	289	297	10	0	0

- Molecule 6 is a protein called RIBOSOMAL PROTEIN US3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	D	225	1752	1117	315	313	7	0	0

- Molecule 7 is a protein called RIBOSOMAL PROTEIN ES4.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	E	262	Total	C	N	O	S	0	0
			2076	1324	386	358	8		

- Molecule 8 is a protein called RIBOSOMAL PROTEIN US7.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	F	189	Total	C	N	O	S	0	0
			1495	934	284	270	7		

- Molecule 9 is a protein called RIBOSOMAL PROTEIN ES6.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	G	230	Total	C	N	O	S	0	0
			1864	1164	373	320	7		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
G	221	ARG	LYS	conflict	UNP P62753

- Molecule 10 is a protein called RIBOSOMAL PROTEIN ES7.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	H	186	Total	C	N	O	S	0	0
			1501	957	276	267	1		

- Molecule 11 is a protein called RIBOSOMAL PROTEIN ES8.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	I	205	Total	C	N	O	S	0	0
			1682	1056	331	290	5		

- Molecule 12 is a protein called RIBOSOMAL PROTEIN US4.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	J	180	Total	C	N	O	S	0	0
			1499	955	300	242	2		

- Molecule 13 is a protein called RIBOSOMAL PROTEIN ES10.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	K	95	Total	C	N	O	S	0	0
			800	522	142	131	5		

- Molecule 14 is a protein called RIBOSOMAL PROTEIN US17.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	L	151	Total	C	N	O	S	0	0
			1229	782	230	211	6		

- Molecule 15 is a protein called RIBOSOMAL PROTEIN ES12.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	M	123	Total	C	N	O	S	0	0
			953	598	169	177	9		

- Molecule 16 is a protein called RIBOSOMAL PROTEIN US15.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	N	149	Total	C	N	O	S	0	0
			1202	770	228	203	1		

- Molecule 17 is a protein called RIBOSOMAL PROTEIN US11.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	O	135	Total	C	N	O	S	0	0
			1010	618	198	188	6		

- Molecule 18 is a protein called RIBOSOMAL PROTEIN US19.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	P	120	Total	C	N	O	S	0	0
			984	625	184	168	7		

- Molecule 19 is a protein called RIBOSOMAL PROTEIN US9.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	Q	139	Total	C	N	O	S	0	0
			1109	704	210	192	3		

- Molecule 20 is a protein called RIBOSOMAL PROTEIN ES17.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	R	132	Total	C	N	O	S	0	0
			1066	669	199	194	4		

- Molecule 21 is a protein called RIBOSOMAL PROTEIN US13.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	S	143	Total	C	N	O	S	0	0
			1184	743	240	200	1		

- Molecule 22 is a protein called RIBOSOMAL PROTEIN ES19.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	T	145	Total	C	N	O	S	0	0
			1128	706	218	201	3		

- Molecule 23 is a protein called RIBOSOMAL PROTEIN US10.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	U	101	Total	C	N	O	S	0	0
			803	504	153	142	4		

- Molecule 24 is a protein called RIBOSOMAL PROTEIN ES21.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	V	82	Total	C	N	O	S	0	0
			625	384	116	120	5		

- Molecule 25 is a protein called RIBOSOMAL PROTEIN US8.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	W	129	Total	C	N	O	S	0	0
			1034	659	193	176	6		

- Molecule 26 is a protein called RIBOSOMAL PROTEIN US12.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	X	141	Total	C	N	O	S	0	0
			1098	693	219	183	3		

- Molecule 27 is a protein called RIBOSOMAL PROTEIN ES24.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	Y	124	Total	C	N	O	S	0	0
			1014	641	198	170	5		

- Molecule 28 is a protein called RIBOSOMAL PROTEIN ES25.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	Z	72	Total	C	N	O	S	0	0
			574	368	104	101	1		

- Molecule 29 is a protein called RIBOSOMAL PROTEIN ES26.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	a	101	Total	C	N	O	S	0	0
			816	509	170	132	5		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
a	78	VAL	ALA	conflict	UNP P62854

- Molecule 30 is a protein called RIBOSOMAL PROTEIN ES27.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	b	82	Total	C	N	O	S	0	0
			640	402	118	113	7		

- Molecule 31 is a protein called RIBOSOMAL PROTEIN ES28.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	c	61	Total	C	N	O	S	0	0
			479	292	95	90	2		

- Molecule 32 is a protein called RIBOSOMAL PROTEIN US14.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	d	55	Total	C	N	O	S	0	0
			458	286	94	73	5		

- Molecule 33 is a protein called RIBOSOMAL PROTEIN ES30.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	e	56	Total	C	N	O	S	0	0
			442	273	96	72	1		

- Molecule 34 is a protein called RIBOSOMAL PROTEIN ES31.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	f	72	Total	C	N	O	S	0	0
			585	366	114	97	8		

- Molecule 35 is a protein called RIBOSOMAL PROTEIN RACK1.

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

- Molecule 36 is a protein called RIBOSOMAL PROTEIN EL41.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	h	24	Total	C	N	O	S	0	0
			231	140	63	26	2		

- Molecule 37 is a protein called RIBOSOMAL PROTEIN EL19.

Mol	Chain	Residues	Atoms				AltConf	Trace
37	r	13	Total	C	N	O	0	0
			118	68	31	19		

- Molecule 38 is a protein called RIBOSOMAL PROTEIN EL24.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	w	62	Total	C	N	O	S	0	0
			452	279	92	80	1		

- Molecule 39 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
39	2	98	Total	Mg	0
			98	98	

- Molecule 40 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms	AltConf
40	a	1	Total Zn 1 1	0
40	d	1	Total Zn 1 1	0
40	f	1	Total Zn 1 1	0

- Molecule 41 is water.

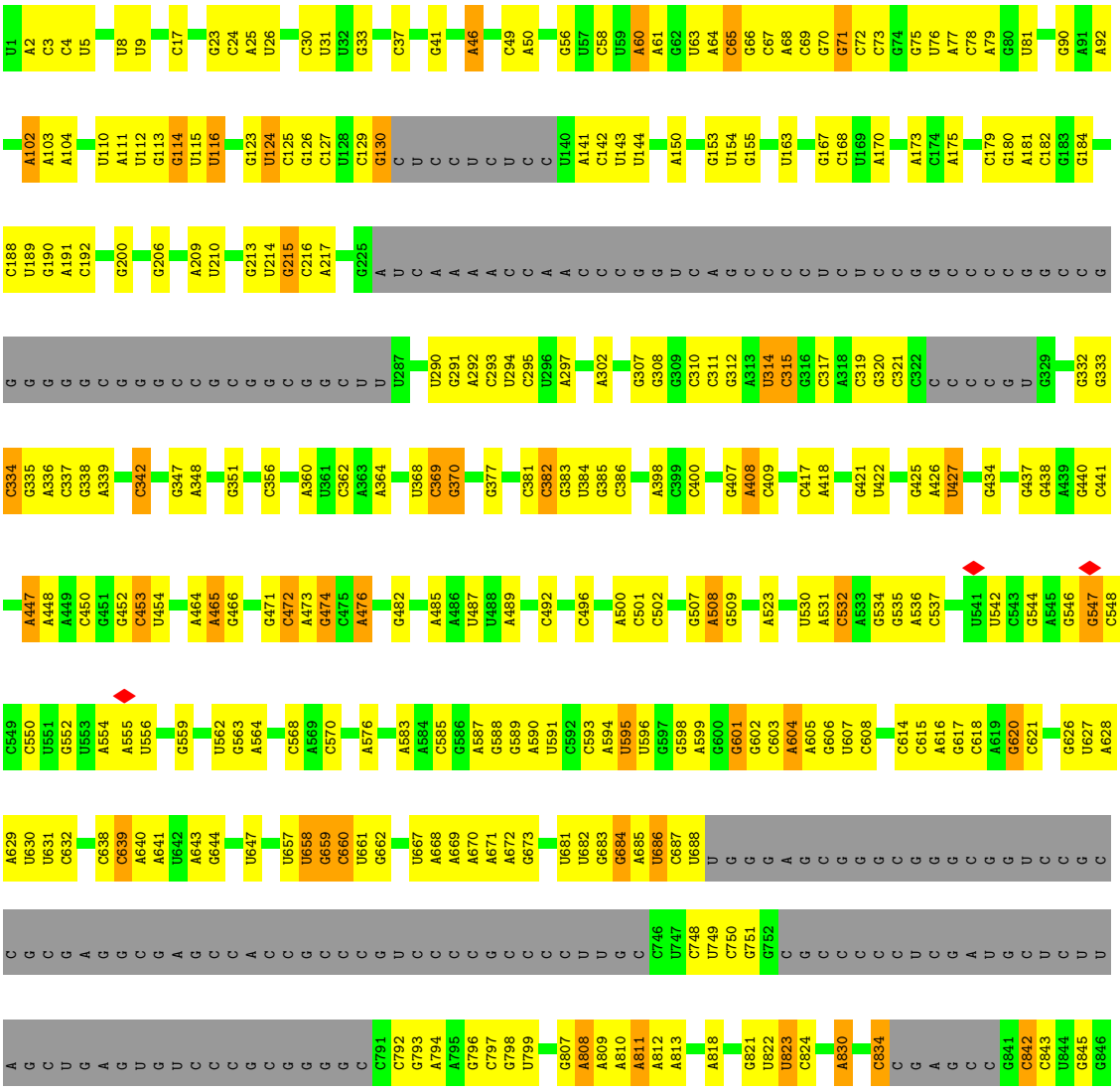
Mol	Chain	Residues	Atoms	AltConf
41	2	141	Total O 141 141	0
41	C	2	Total O 2 2	0
41	e	1	Total O 1 1	0

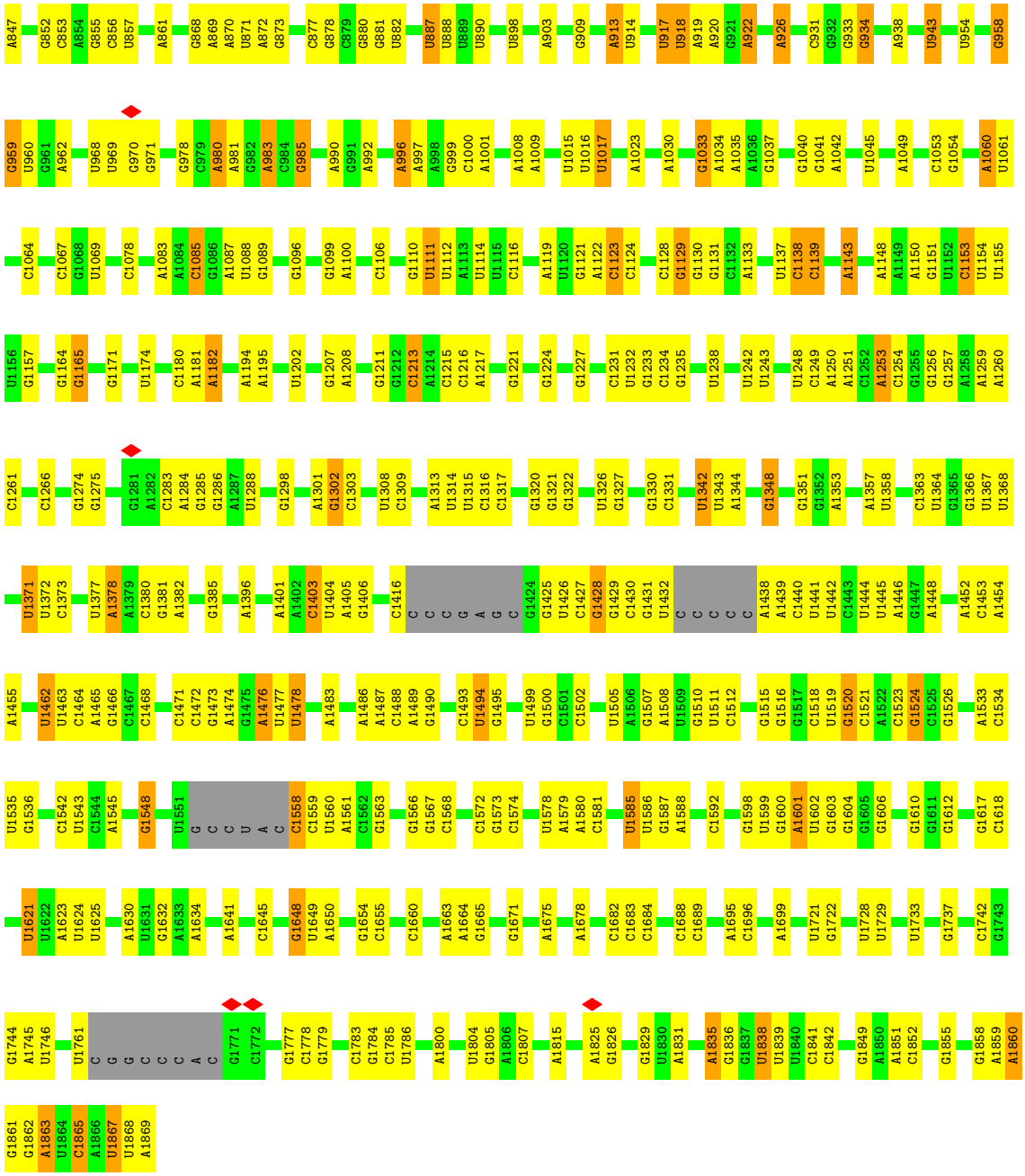
3 Residue-property plots (i)

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

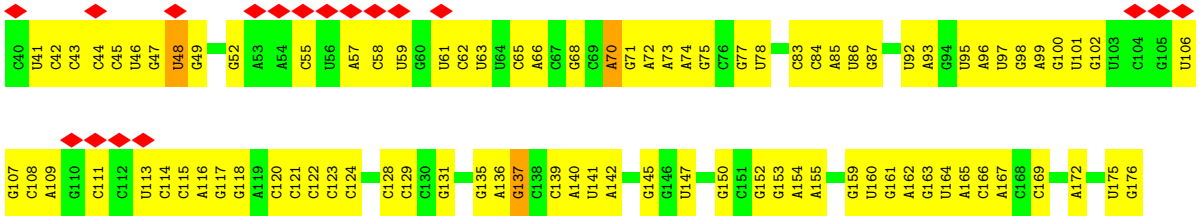
Chain 2:

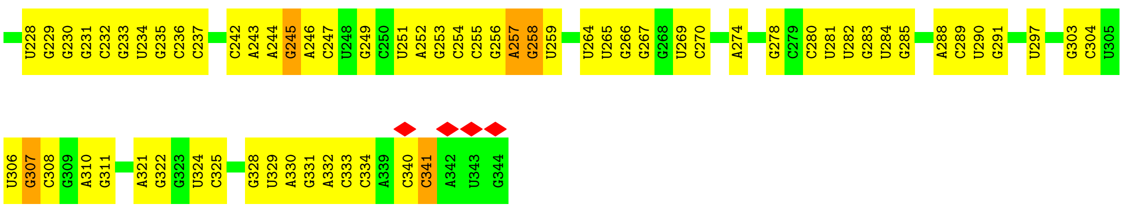




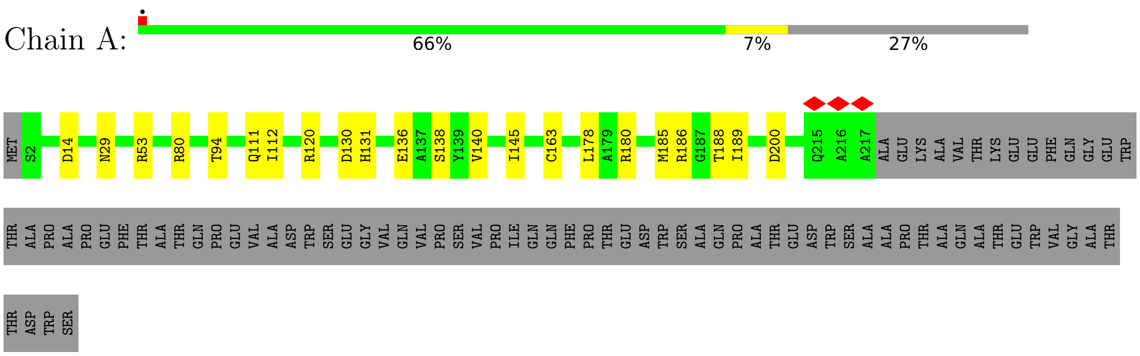
• Molecule 2: HCV IRES

Chain 3:

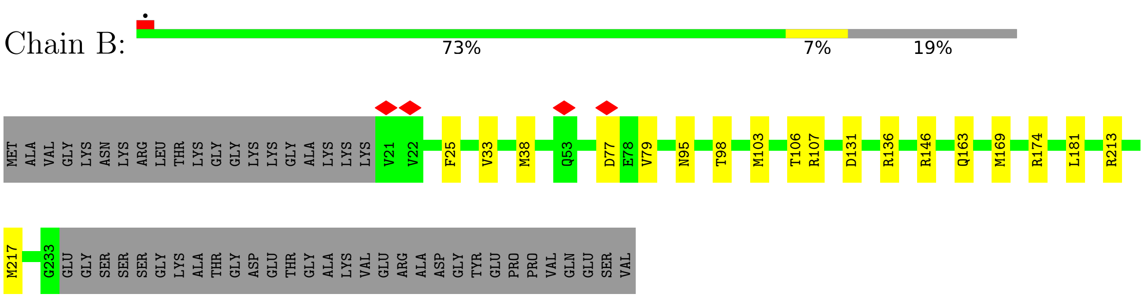




• Molecule 3: RIBOSOMAL PROTEIN US2

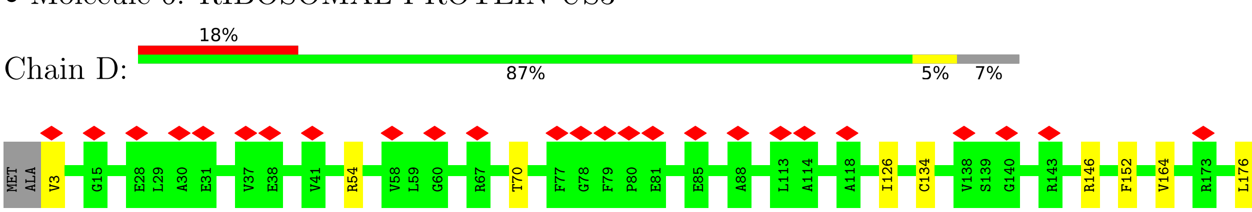


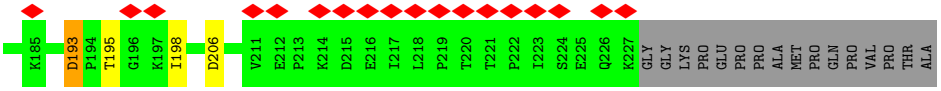
• Molecule 4: RIBOSOMAL PROTEIN ES1



• Molecule 5: RIBOSOMAL PROTEIN US5

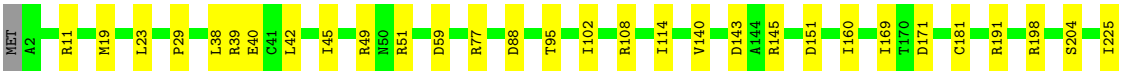
• Molecule 6: RIBOSOMAL PROTEIN US3





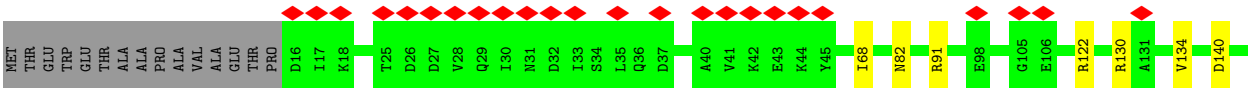
• Molecule 7: RIBOSOMAL PROTEIN ES4

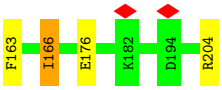
Chain E:



• Molecule 8: RIBOSOMAL PROTEIN US7

Chain F:





• Molecule 9: RIBOSOMAL PROTEIN ES6

Chain G:

• Molecule 10: RIBOSOMAL PROTEIN ES7

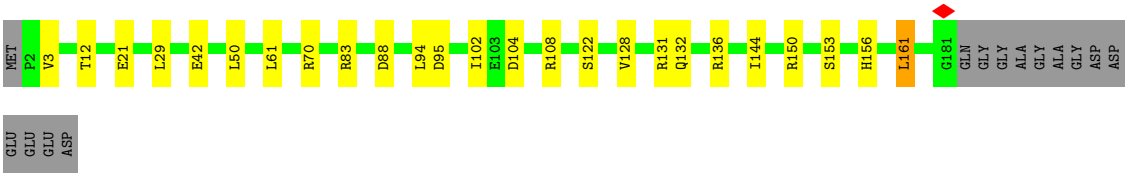
Chain H:

• Molecule 11: RIBOSOMAL PROTEIN ES8

Chain I:

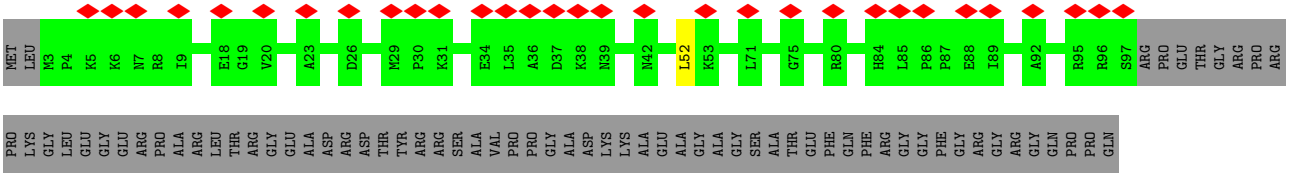
• Molecule 12: RIBOSOMAL PROTEIN US4

Chain J:



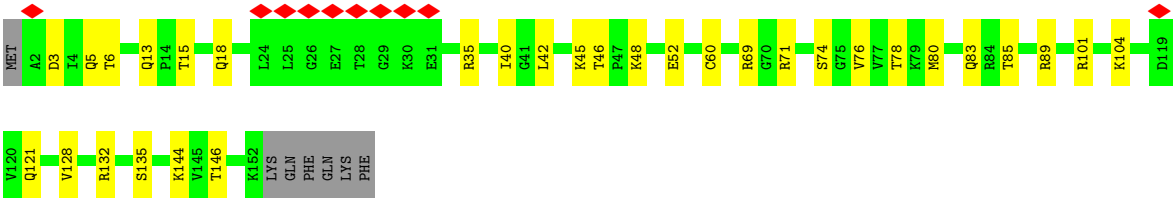
• Molecule 13: RIBOSOMAL PROTEIN ES10

Chain K:



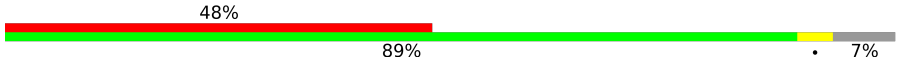
• Molecule 14: RIBOSOMAL PROTEIN US17

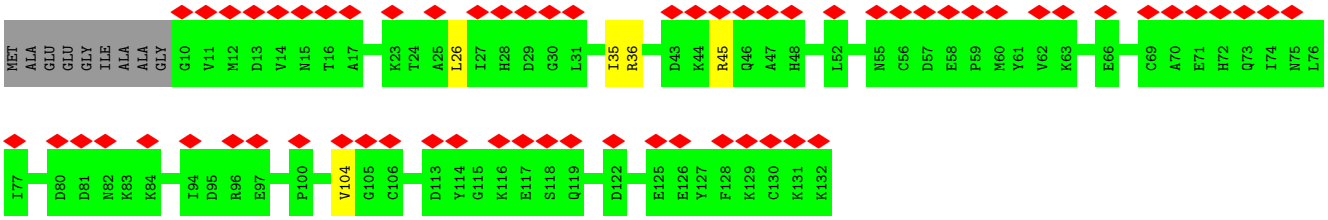
Chain L:



• Molecule 15: RIBOSOMAL PROTEIN ES12

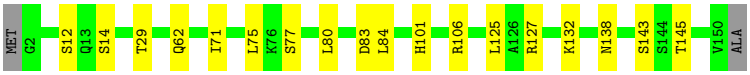
Chain M:





• Molecule 16: RIBOSOMAL PROTEIN US15

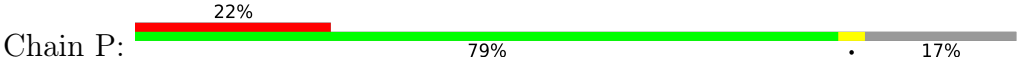
Chain N:

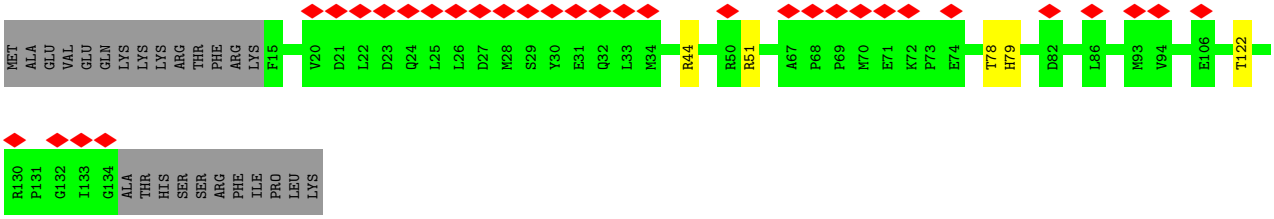


• Molecule 17: RIBOSOMAL PROTEIN US11

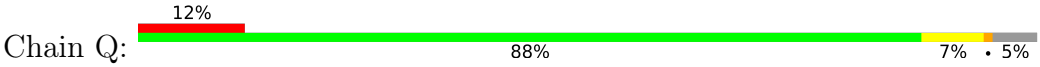
Chain O:

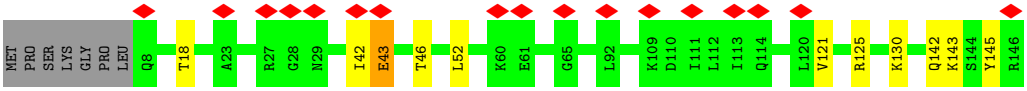
• Molecule 18: RIBOSOMAL PROTEIN US19



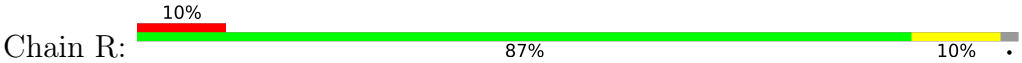


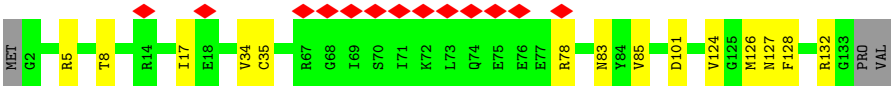
• Molecule 19: RIBOSOMAL PROTEIN US9



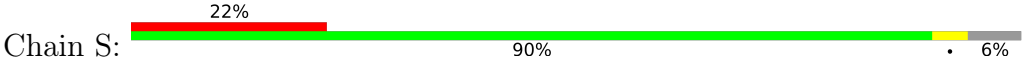


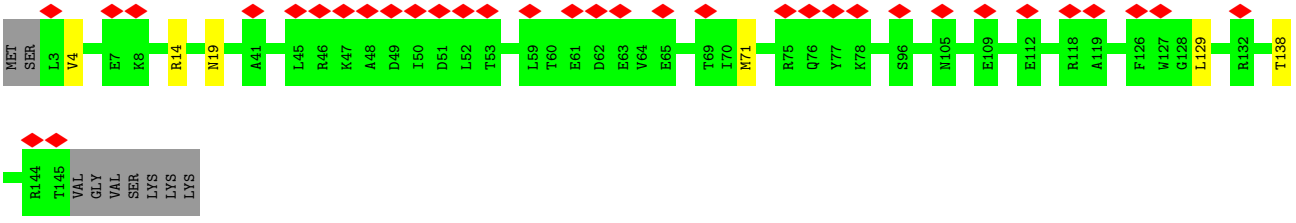
• Molecule 20: RIBOSOMAL PROTEIN ES17



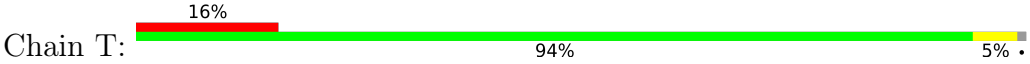


• Molecule 21: RIBOSOMAL PROTEIN US13



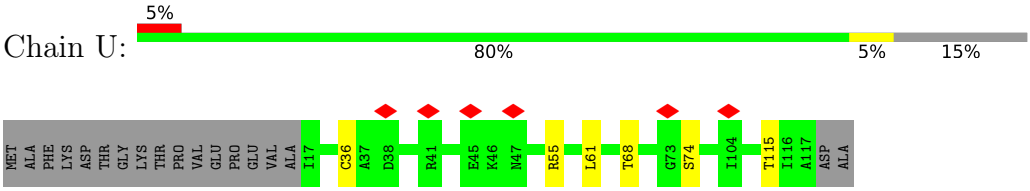


• Molecule 22: RIBOSOMAL PROTEIN ES19



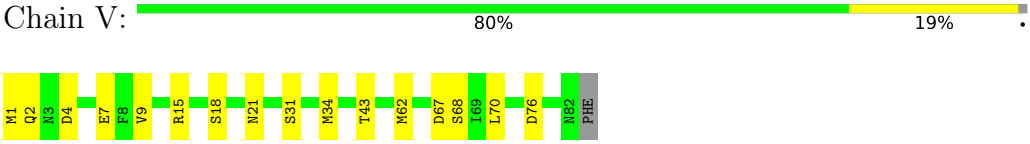
• Molecule 23: RIBOSOMAL PROTEIN US10

Chain U:



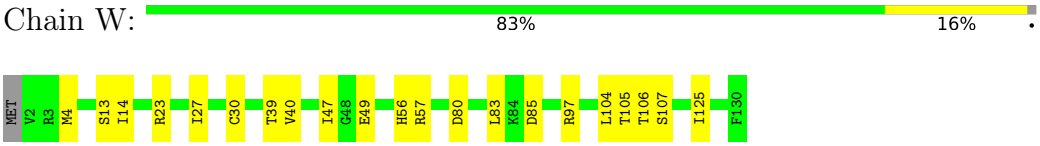
• Molecule 24: RIBOSOMAL PROTEIN ES21

Chain V:



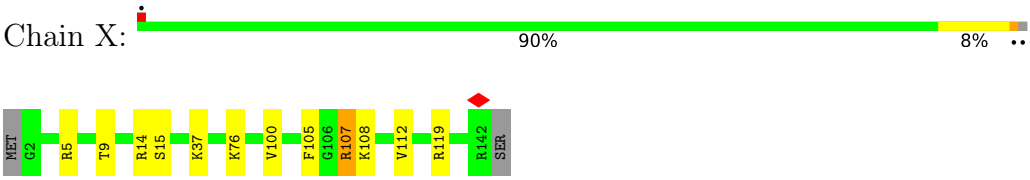
• Molecule 25: RIBOSOMAL PROTEIN US8

Chain W:



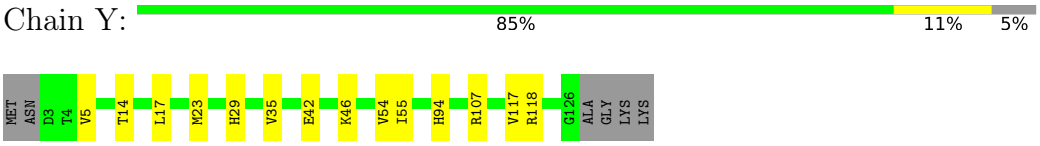
• Molecule 26: RIBOSOMAL PROTEIN US12

Chain X:



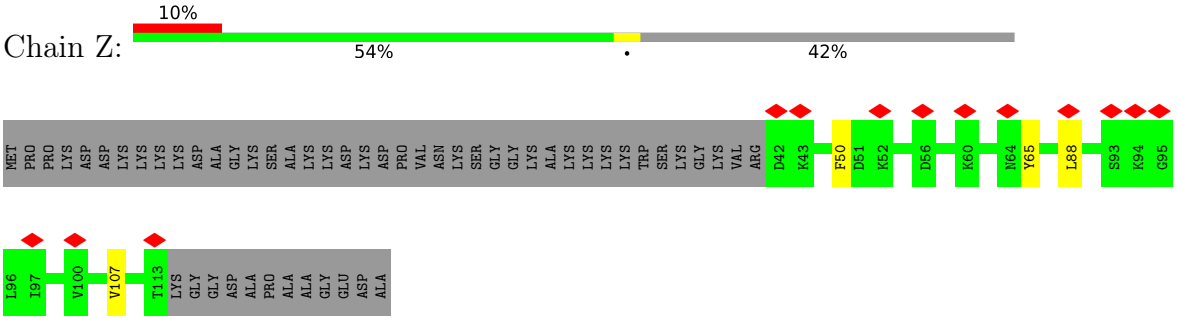
• Molecule 27: RIBOSOMAL PROTEIN ES24

Chain Y:



• Molecule 28: RIBOSOMAL PROTEIN ES25

Chain Z:

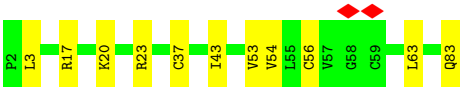


• Molecule 29: RIBOSOMAL PROTEIN ES26

Chain a:

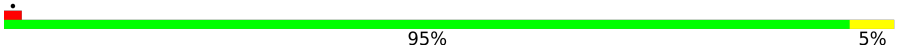
• Molecule 30: RIBOSOMAL PROTEIN ES27

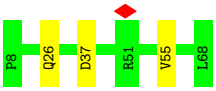
Chain b:



• Molecule 31: RIBOSOMAL PROTEIN ES28

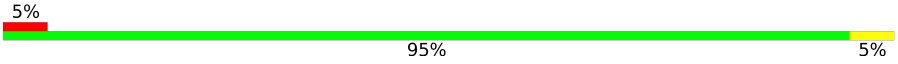
Chain c:

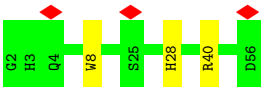




• Molecule 32: RIBOSOMAL PROTEIN US14

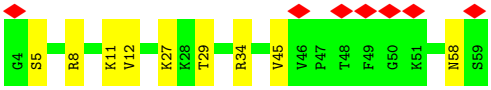
Chain d:





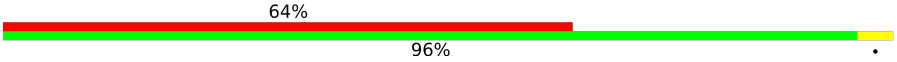
• Molecule 33: RIBOSOMAL PROTEIN ES30

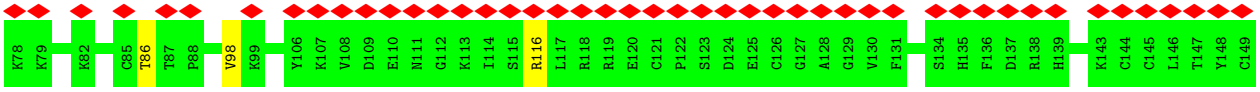
Chain e:



• Molecule 34: RIBOSOMAL PROTEIN ES31

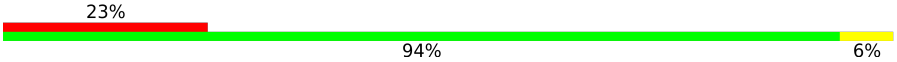
Chain f:

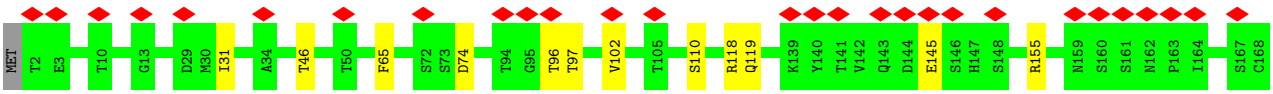




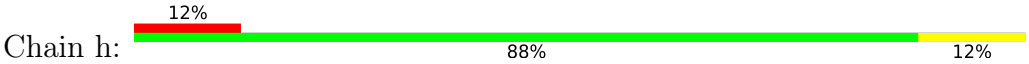
• Molecule 35: RIBOSOMAL PROTEIN RACK1

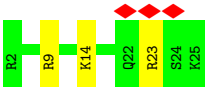
Chain g:



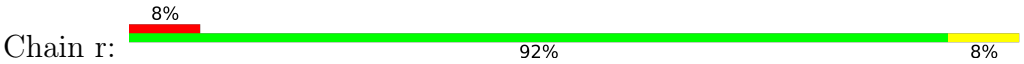


• Molecule 36: RIBOSOMAL PROTEIN EL41





• Molecule 37: RIBOSOMAL PROTEIN EL19



• Molecule 38: RIBOSOMAL PROTEIN EL24

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	404357	Depositor
Resolution determination method	Not provided	
CTF correction method	INDIVIDUAL FRAMES	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	20.00	Depositor
Minimum defocus (nm)	1500.00	Depositor
Maximum defocus (nm)	3400.00	Depositor
Magnification	100719	Depositor
Image detector	FEI FALCON II (4k x 4k)	Depositor
Maximum map value	0.475	Depositor
Minimum map value	-0.256	Depositor
Average map value	0.004	Depositor
Map value standard deviation	0.021	Depositor
Recommended contour level	0.05	Depositor
Map size (Å)	300.24, 300.24, 300.24	wwPDB
Map dimensions	216, 216, 216	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.39, 1.39, 1.39	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: MG, ZN

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$\|Z\|$ >5	RMSZ	#$\|Z\|$ >5
1	2	0.74	11/39755 (0.0%)	1.24	222/61954 (0.4%)
2	3	0.40	0/6127	1.02	8/9547 (0.1%)
3	A	0.48	0/1742	0.63	0/2367
4	B	0.52	0/1756	0.68	0/2350
5	C	0.61	0/1726	0.77	4/2332 (0.2%)
6	D	0.35	0/1780	0.53	0/2397
7	E	0.57	0/2118	0.69	0/2849
8	F	0.34	0/1516	0.55	0/2037
9	G	0.42	0/1887	0.60	0/2513
10	H	0.44	0/1524	0.61	0/2042
11	I	0.51	0/1711	0.66	1/2282 (0.0%)
12	J	0.57	0/1524	0.67	0/2035
13	K	0.32	0/824	0.46	0/1112
14	L	0.62	0/1250	0.72	0/1673
15	M	0.32	0/963	0.50	0/1291
16	N	0.51	0/1226	0.66	0/1649
17	O	0.52	0/1023	0.75	0/1372
18	P	0.34	0/1003	0.52	0/1341
19	Q	0.35	0/1126	0.55	1/1506 (0.1%)
20	R	0.39	0/1080	0.58	0/1449
21	S	0.33	0/1202	0.50	0/1610
22	T	0.35	0/1148	0.50	0/1538
23	U	0.34	0/813	0.52	0/1092
24	V	0.51	0/631	0.63	0/844
25	W	0.65	0/1051	0.73	0/1406
26	X	0.62	0/1116	0.71	0/1490
27	Y	0.51	0/1031	0.64	0/1370
28	Z	0.28	0/580	0.48	0/780
29	a	0.56	0/830	0.64	0/1112
30	b	0.51	0/653	0.69	0/876
31	c	0.38	0/481	0.59	0/643
32	d	0.36	0/469	0.59	0/623

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#|Z| >5	RMSZ	#|Z| >5
33	e	0.46	0/447	0.59	0/587
34	f	0.30	0/595	0.50	0/785
35	g	0.31	0/2497	0.52	0/3399
36	h	0.57	0/232	0.65	0/295
37	r	0.29	0/117	0.44	0/149
38	w	0.37	0/368	0.43	0/485
All	All	0.60	11/85922 (0.0%)	1.00	236/125182 (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
6	D	0	1
10	H	0	1
26	X	0	2
27	Y	0	1
35	g	0	1
All	All	0	6

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	2	1353	A	N9-C4	-6.78	1.33	1.37
1	2	1085	C	N1-C6	-6.62	1.33	1.37
1	2	599	A	N9-C4	-6.35	1.34	1.37
1	2	1000	C	N1-C6	-6.09	1.33	1.37
1	2	808	A	N9-C4	-5.94	1.34	1.37
1	2	476	A	N9-C4	-5.59	1.34	1.37
1	2	1825	A	N9-C4	5.32	1.41	1.37
1	2	813	A	N9-C4	-5.28	1.34	1.37
1	2	348	A	N9-C4	-5.27	1.34	1.37
1	2	1396	A	N9-C4	5.25	1.41	1.37
1	2	474	G	C6-N1	-5.08	1.35	1.39

All (236) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	2	501	C	N1-C2-O2	10.93	125.45	118.90
1	2	501	C	C2-N1-C1'	10.11	129.93	118.80
1	2	1842	C	C6-N1-C2	-9.59	116.46	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	2	501	C	C6-N1-C1'	-9.28	109.67	120.80
1	2	1139	C	C6-N1-C2	-9.27	116.59	120.30
1	2	1842	C	N3-C4-C5	-9.24	118.20	121.90
1	2	1520	G	C4-N9-C1'	9.04	138.25	126.50
1	2	1060	A	O4'-C1'-N9	8.61	115.09	108.20
1	2	853	C	N3-C2-O2	-8.50	115.95	121.90
1	2	1213	C	C6-N1-C2	8.42	123.67	120.30
1	2	1655	C	C6-N1-C2	-8.24	117.00	120.30
1	2	60	A	N1-C2-N3	8.15	133.38	129.30
1	2	958	G	C8-N9-C4	-8.04	103.18	106.40
1	2	1085	C	C6-N1-C2	7.95	123.48	120.30
1	2	1085	C	C5-C6-N1	-7.89	117.06	121.00
1	2	508	A	C8-N9-C4	-7.82	102.67	105.80
1	2	1253	A	P-O3'-C3'	7.73	128.98	119.70
1	2	1858	G	C4-C5-N7	7.64	113.86	110.80
1	2	1314	U	C2-N1-C1'	7.61	126.83	117.70
1	2	913	A	O4'-C1'-N9	7.54	114.23	108.20
1	2	1835	A	P-O3'-C3'	7.45	128.64	119.70
1	2	447	A	N1-C6-N6	-7.33	114.20	118.60
1	2	639	C	C6-N1-C2	-7.31	117.38	120.30
1	2	1520	G	C8-N9-C1'	-7.29	117.52	127.00
1	2	1357	A	N1-C2-N3	7.28	132.94	129.30
1	2	1838	U	P-O3'-C3'	7.24	128.38	119.70
1	2	686	U	N1-C2-O2	-7.22	117.74	122.80
1	2	501	C	N3-C2-O2	-7.17	116.88	121.90
1	2	1139	C	N3-C4-C5	-7.16	119.04	121.90
1	2	30	C	C6-N1-C2	-7.08	117.47	120.30
1	2	983	A	C6-N1-C2	-6.96	114.43	118.60
1	2	943	U	C2-N3-C4	-6.92	122.85	127.00
1	2	813	A	C2-N3-C4	-6.81	107.20	110.60
1	2	1139	C	N3-C2-O2	-6.77	117.16	121.90
1	2	823	U	N3-C2-O2	-6.73	117.49	122.20
1	2	408	A	P-O3'-C3'	6.72	127.76	119.70
1	2	868	G	N3-C4-C5	6.71	131.96	128.60
1	2	65	C	C6-N1-C2	-6.67	117.63	120.30
1	2	370	G	C8-N9-C4	6.66	109.06	106.40
1	2	834	C	C6-N1-C2	-6.63	117.65	120.30
1	2	65	C	C5-C6-N1	6.59	124.29	121.00
1	2	830	A	C6-N1-C2	-6.58	114.65	118.60
1	2	958	G	O4'-C1'-N9	6.57	113.46	108.20
1	2	1069	U	C6-N1-C2	6.56	124.94	121.00
1	2	958	G	N7-C8-N9	6.56	116.38	113.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	2	1182	A	C8-N9-C4	-6.56	103.18	105.80
1	2	958	G	P-O3'-C3'	6.54	127.55	119.70
1	2	659	G	N3-C4-N9	6.53	129.92	126.00
5	C	233	LEU	CA-CB-CG	-6.51	100.32	115.30
1	2	1453	C	C2-N1-C1'	6.51	125.96	118.80
1	2	595	U	N1-C2-N3	6.51	118.81	114.90
1	2	1123	C	C6-N1-C2	-6.49	117.70	120.30
1	2	1865	C	N3-C2-O2	-6.37	117.44	121.90
1	2	1520	G	C6-C5-N7	-6.35	126.59	130.40
1	2	447	A	N9-C4-C5	6.35	108.34	105.80
1	2	604	A	N1-C2-N3	6.33	132.47	129.30
1	2	667	U	C5-C6-N1	-6.33	119.53	122.70
1	2	1520	G	N7-C8-N9	6.30	116.25	113.10
1	2	926	A	C8-N9-C4	-6.27	103.29	105.80
1	2	1182	A	N7-C8-N9	6.25	116.92	113.80
5	C	99	GLY	N-CA-C	-6.24	97.49	113.10
1	2	1804	U	N1-C2-O2	6.24	127.16	122.80
1	2	356	C	N1-C2-O2	6.23	122.64	118.90
1	2	1037	G	C8-N9-C4	-6.18	103.93	106.40
1	2	114	G	P-O3'-C3'	6.17	127.10	119.70
1	2	1860	A	O5'-P-OP2	-6.16	100.15	105.70
1	2	1621	U	C2-N1-C1'	6.15	125.08	117.70
1	2	71	G	C8-N9-C4	-6.14	103.94	106.40
1	2	382	C	P-O3'-C3'	6.07	126.99	119.70
1	2	1348	G	N3-C4-C5	-6.07	125.57	128.60
1	2	1520	G	N3-C4-N9	6.06	129.64	126.00
1	2	1648	G	P-O3'-C3'	6.04	126.95	119.70
2	3	245	G	O5'-P-OP1	-6.01	100.29	105.70
1	2	1520	G	N3-C4-C5	-5.97	125.61	128.60
1	2	1153	C	C2-N1-C1'	5.93	125.32	118.80
1	2	73	C	C6-N1-C2	-5.92	117.93	120.30
1	2	659	G	C6-N1-C2	-5.91	121.55	125.10
1	2	102	A	C8-N9-C4	-5.91	103.44	105.80
1	2	1585	U	P-O3'-C3'	5.86	126.73	119.70
1	2	960	U	N3-C2-O2	-5.85	118.11	122.20
1	2	73	C	C5-C6-N1	5.83	123.91	121.00
1	2	1342	U	P-O3'-C3'	5.79	126.64	119.70
1	2	926	A	N7-C8-N9	5.77	116.69	113.80
1	2	532	C	C6-N1-C2	-5.76	118.00	120.30
1	2	1601	A	P-O3'-C3'	5.76	126.61	119.70
1	2	342	C	C2-N1-C1'	5.76	125.13	118.80
1	2	1471	C	C6-N1-C2	-5.75	118.00	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	2	1684	C	C6-N1-C2	-5.74	118.00	120.30
1	2	830	A	N1-C2-N3	5.74	132.17	129.30
1	2	660	C	C6-N1-C2	5.72	122.59	120.30
1	2	599	A	C8-N9-C4	5.71	108.08	105.80
1	2	604	A	C8-N9-C4	-5.71	103.52	105.80
1	2	1733	U	N3-C2-O2	-5.68	118.22	122.20
1	2	1842	C	C5-C6-N1	5.68	123.84	121.00
1	2	337	C	C2-N1-C1'	5.67	125.04	118.80
1	2	1085	C	C2-N3-C4	-5.64	117.08	119.90
1	2	1155	U	C5-C6-N1	-5.63	119.89	122.70
1	2	1033	G	N3-C4-N9	5.62	129.37	126.00
1	2	682	U	C5-C6-N1	-5.61	119.89	122.70
1	2	64	A	C2-N3-C4	-5.61	107.79	110.60
1	2	427	U	N3-C2-O2	-5.61	118.27	122.20
1	2	853	C	C2-N1-C1'	5.60	124.96	118.80
1	2	661	U	C5-C6-N1	-5.59	119.90	122.70
1	2	1520	G	C8-N9-C4	-5.59	104.16	106.40
1	2	1034	A	C8-N9-C4	5.59	108.04	105.80
1	2	1314	U	C6-N1-C1'	-5.58	113.39	121.20
1	2	1558	C	C6-N1-C2	-5.57	118.07	120.30
1	2	855	G	C8-N9-C4	5.57	108.63	106.40
1	2	1138	C	C6-N1-C2	5.56	122.53	120.30
2	3	307	G	C4-N9-C1'	5.56	133.73	126.50
1	2	1524	G	N3-C4-N9	5.55	129.33	126.00
1	2	857	U	N1-C2-O2	5.55	126.68	122.80
1	2	959	G	C6-C5-N7	-5.54	127.08	130.40
1	2	1111	U	C2-N1-C1'	5.53	124.34	117.70
1	2	604	A	P-O3'-C3'	5.53	126.33	119.70
1	2	1865	C	N1-C2-O2	5.52	122.21	118.90
1	2	1842	C	C2-N3-C4	5.51	122.66	119.90
1	2	112	U	C5-C6-N1	-5.51	119.94	122.70
1	2	314	U	P-O3'-C3'	5.51	126.31	119.70
1	2	842	C	C2-N1-C1'	5.51	124.86	118.80
1	2	917	U	C2-N3-C4	5.51	130.30	127.00
1	2	1174	U	C6-N1-C2	-5.50	117.70	121.00
1	2	1151	G	C8-N9-C4	5.50	108.60	106.40
1	2	684	G	N3-C4-C5	5.50	131.35	128.60
1	2	1314	U	N1-C2-O2	5.49	126.64	122.80
1	2	474	G	N3-C4-C5	-5.49	125.86	128.60
1	2	1064	C	C6-N1-C2	-5.48	118.11	120.30
1	2	1488	C	C6-N1-C2	-5.47	118.11	120.30
1	2	620	G	P-O3'-C3'	5.46	126.25	119.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
19	Q	43	GLU	C-N-CD	5.46	139.86	128.40
1	2	130	G	C4-N9-C1'	5.45	133.59	126.50
1	2	686	U	N3-C2-O2	5.45	126.02	122.20
1	2	508	A	N7-C8-N9	5.45	116.53	113.80
1	2	601	G	C3'-C2'-C1'	5.45	105.86	101.50
1	2	124	U	C2-N1-C1'	5.43	124.22	117.70
1	2	422	U	N1-C2-N3	5.42	118.15	114.90
1	2	71	G	N3-C4-C5	-5.40	125.90	128.60
1	2	1478	U	N1-C2-O2	5.39	126.57	122.80
1	2	90	G	N3-C4-C5	-5.39	125.91	128.60
1	2	102	A	P-O3'-C3'	5.38	126.16	119.70
1	2	853	C	N1-C2-O2	5.38	122.13	118.90
1	2	452	G	P-O3'-C3'	5.38	126.15	119.70
1	2	811	A	P-O3'-C3'	5.38	126.15	119.70
1	2	130	G	N3-C4-C5	-5.37	125.91	128.60
1	2	1234	C	N1-C2-O2	5.37	122.12	118.90
2	3	258	G	O4'-C1'-N9	5.37	112.49	108.20
1	2	465	A	P-O3'-C3'	5.36	126.13	119.70
1	2	918	U	N1-C2-N3	5.36	118.11	114.90
1	2	447	A	C6-N1-C2	-5.35	115.39	118.60
1	2	641	A	N1-C2-N3	5.35	131.97	129.30
2	3	70	A	C4-N9-C1'	5.35	135.93	126.30
2	3	257	A	P-O3'-C3'	5.34	126.11	119.70
2	3	48	U	P-O3'-C3'	5.33	126.09	119.70
1	2	1139	C	C5-C4-N4	5.33	123.93	120.20
1	2	1476	A	P-O3'-C3'	5.33	126.09	119.70
1	2	46	A	N9-C4-C5	5.31	107.92	105.80
1	2	1143	A	N9-C4-C5	5.30	107.92	105.80
1	2	620	G	N9-C4-C5	5.29	107.52	105.40
1	2	996	A	C3'-C2'-C1'	5.29	105.73	101.50
1	2	215	G	C4-N9-C1'	5.28	133.37	126.50
1	2	659	G	C8-N9-C1'	-5.28	120.13	127.00
1	2	1351	G	N3-C4-C5	-5.28	125.96	128.60
1	2	1368	U	N1-C2-N3	5.28	118.07	114.90
1	2	1478	U	C2-N1-C1'	5.28	124.03	117.70
1	2	1129	G	N3-C4-C5	-5.28	125.96	128.60
1	2	1139	C	C4-C5-C6	5.27	120.03	117.40
1	2	1494	U	P-O3'-C3'	5.27	126.02	119.70
1	2	1128	C	C6-N1-C2	5.26	122.40	120.30
1	2	369	C	C2-N1-C1'	5.25	124.58	118.80
1	2	334	C	C6-N1-C2	-5.25	118.20	120.30
1	2	1592	C	C6-N1-C2	-5.25	118.20	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	2	1378	A	C8-N9-C4	-5.25	103.70	105.80
1	2	1302	G	P-O3'-C3'	5.25	126.00	119.70
1	2	382	C	C5-C6-N1	5.24	123.62	121.00
1	2	24	C	C6-N1-C2	5.24	122.39	120.30
1	2	1035	A	C8-N9-C4	5.23	107.89	105.80
1	2	476	A	C8-N9-C4	5.23	107.89	105.80
1	2	30	C	N3-C2-O2	-5.23	118.24	121.90
1	2	639	C	C2-N1-C1'	5.23	124.55	118.80
1	2	922	A	N1-C2-N3	5.23	131.91	129.30
1	2	1123	C	C5-C6-N1	5.22	123.61	121.00
1	2	1016	U	N3-C2-O2	-5.22	118.54	122.20
11	I	67	TRP	CA-CB-CG	5.22	123.62	113.70
1	2	983	A	C5-C6-N6	-5.22	119.53	123.70
1	2	1478	U	N3-C2-O2	-5.21	118.55	122.20
1	2	92	A	C6-N1-C2	-5.21	115.47	118.60
1	2	1164	G	C6-N1-C2	-5.20	121.98	125.10
1	2	1363	C	C6-N1-C2	5.20	122.38	120.30
1	2	630	U	N1-C2-O2	5.20	126.44	122.80
1	2	595	U	C2-N3-C4	-5.20	123.88	127.00
1	2	370	G	N7-C8-N9	-5.19	110.51	113.10
1	2	382	C	C6-N1-C2	-5.19	118.22	120.30
1	2	1403	C	P-O3'-C3'	5.19	125.92	119.70
1	2	1863	A	N1-C6-N6	-5.19	115.49	118.60
1	2	1428	G	C8-N9-C4	-5.18	104.33	106.40
1	2	1524	G	C8-N9-C1'	-5.16	120.30	127.00
1	2	658	U	C5-C6-N1	-5.14	120.13	122.70
1	2	453	C	C3'-C2'-C1'	5.13	105.60	101.50
1	2	1867	U	C6-N1-C1'	-5.13	114.02	121.20
1	2	681	U	N3-C2-O2	-5.13	118.61	122.20
1	2	659	G	C5-C6-N1	5.12	114.06	111.50
1	2	1696	C	C6-N1-C2	-5.12	118.25	120.30
1	2	1502	C	C6-N1-C2	-5.12	118.25	120.30
1	2	547	G	P-O3'-C3'	5.11	125.84	119.70
1	2	922	A	C6-N1-C2	-5.11	115.53	118.60
5	C	134	ASN	N-CA-C	5.11	124.80	111.00
1	2	472	C	N1-C2-O2	-5.11	115.84	118.90
1	2	662	G	C4-C5-N7	5.10	112.84	110.80
1	2	1165	G	C5-C6-N1	5.10	114.05	111.50
5	C	171	GLY	N-CA-C	-5.10	100.35	113.10
1	2	315	C	C6-N1-C2	-5.09	118.27	120.30
1	2	887	U	C2-N1-C1'	5.08	123.79	117.70
1	2	64	A	O5'-P-OP2	-5.07	101.13	105.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	2	1624	U	C2-N1-C1'	5.07	123.78	117.70
1	2	1106	C	C6-N1-C2	-5.07	118.27	120.30
1	2	667	U	C2-N3-C4	-5.07	123.96	127.00
1	2	1015	U	C2-N1-C1'	-5.07	111.62	117.70
1	2	1182	A	C6-C5-N7	-5.07	128.75	132.30
1	2	1462	U	C2-N1-C1'	5.07	123.78	117.70
1	2	116	U	C6-N1-C2	-5.06	117.96	121.00
1	2	595	U	C5-C6-N1	-5.06	120.17	122.70
2	3	137	G	C4-N9-C1'	5.06	133.08	126.50
1	2	660	C	N1-C2-N3	-5.06	115.66	119.20
1	2	1472	C	C6-N1-C2	-5.05	118.28	120.30
1	2	293	C	N3-C2-O2	-5.05	118.37	121.90
1	2	1548	G	C8-N9-C4	-5.05	104.38	106.40
1	2	934	G	O5'-P-OP2	-5.04	101.16	105.70
1	2	1371	U	C5-C6-N1	-5.04	120.18	122.70
1	2	980	A	P-O3'-C3'	5.04	125.75	119.70
1	2	1017	U	N3-C2-O2	-5.03	118.68	122.20
2	3	341	C	C6-N1-C2	-5.03	118.29	120.30
1	2	1357	A	C2-N3-C4	-5.03	108.09	110.60
1	2	808	A	C8-N9-C4	5.02	107.81	105.80
1	2	686	U	C2-N1-C1'	-5.02	111.68	117.70
1	2	985	G	C6-N1-C2	-5.02	122.09	125.10
1	2	1858	G	C5-N7-C8	-5.00	101.80	104.30

There are no chirality outliers.

All (6) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
6	D	193	ASP	Peptide
10	H	134	VAL	Peptide
26	X	107	ARG	Peptide
26	X	112	VAL	Peptide
27	Y	118	ARG	Peptide
35	g	190	GLY	Peptide

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	
3	A	214/295 (72%)	202 (94%)	11 (5%)	1 (0%)	25	60
4	B	211/264 (80%)	200 (95%)	11 (5%)	0	100	100
5	C	216/293 (74%)	213 (99%)	3 (1%)	0	100	100
6	D	223/243 (92%)	214 (96%)	8 (4%)	1 (0%)	30	65
7	E	260/263 (99%)	252 (97%)	8 (3%)	0	100	100
8	F	187/204 (92%)	169 (90%)	16 (9%)	2 (1%)	12	45
9	G	228/249 (92%)	217 (95%)	11 (5%)	0	100	100
10	H	184/194 (95%)	172 (94%)	11 (6%)	1 (0%)	25	60
11	I	203/208 (98%)	196 (97%)	7 (3%)	0	100	100
12	J	178/194 (92%)	172 (97%)	5 (3%)	1 (1%)	22	57
13	K	93/165 (56%)	89 (96%)	4 (4%)	0	100	100
14	L	149/158 (94%)	145 (97%)	4 (3%)	0	100	100
15	M	121/132 (92%)	112 (93%)	9 (7%)	0	100	100
16	N	147/151 (97%)	143 (97%)	4 (3%)	0	100	100
17	O	133/151 (88%)	127 (96%)	6 (4%)	0	100	100
18	P	118/145 (81%)	116 (98%)	2 (2%)	0	100	100
19	Q	137/146 (94%)	131 (96%)	6 (4%)	0	100	100
20	R	130/135 (96%)	122 (94%)	8 (6%)	0	100	100
21	S	141/152 (93%)	136 (96%)	5 (4%)	0	100	100
22	T	143/146 (98%)	138 (96%)	4 (3%)	1 (1%)	19	54
23	U	99/119 (83%)	94 (95%)	5 (5%)	0	100	100
24	V	80/83 (96%)	78 (98%)	2 (2%)	0	100	100
25	W	127/130 (98%)	121 (95%)	6 (5%)	0	100	100
26	X	139/143 (97%)	130 (94%)	8 (6%)	1 (1%)	19	54
27	Y	122/130 (94%)	118 (97%)	4 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
28	Z	70/125 (56%)	66 (94%)	4 (6%)	0	100 100
29	a	99/101 (98%)	93 (94%)	6 (6%)	0	100 100
30	b	80/82 (98%)	77 (96%)	3 (4%)	0	100 100
31	c	59/61 (97%)	56 (95%)	3 (5%)	0	100 100
32	d	53/55 (96%)	51 (96%)	2 (4%)	0	100 100
33	e	54/56 (96%)	51 (94%)	3 (6%)	0	100 100
34	f	70/72 (97%)	65 (93%)	5 (7%)	0	100 100
35	g	312/315 (99%)	295 (95%)	15 (5%)	2 (1%)	22 57
36	h	22/24 (92%)	22 (100%)	0	0	100 100
37	r	11/13 (85%)	11 (100%)	0	0	100 100
38	w	47/62 (76%)	47 (100%)	0	0	100 100
All	All	4860/5459 (89%)	4641 (96%)	209 (4%)	10 (0%)	45 75

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	A	189	ILE
10	H	170	VAL
12	J	161	LEU
35	g	145	GLU
26	X	108	LYS
8	F	163	PHE
35	g	119	GLN
6	D	193	ASP
22	T	4	VAL
8	F	166	ILE

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
3	A	180/243 (74%)	159 (88%)	21 (12%)	4 20

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
4	B	194/231 (84%)	175 (90%)	19 (10%)	6 24
5	C	184/225 (82%)	140 (76%)	44 (24%)	0 4
6	D	189/202 (94%)	177 (94%)	12 (6%)	15 40
7	E	224/225 (100%)	189 (84%)	35 (16%)	2 13
8	F	159/170 (94%)	149 (94%)	10 (6%)	15 40
9	G	200/218 (92%)	180 (90%)	20 (10%)	6 24
10	H	167/174 (96%)	152 (91%)	15 (9%)	8 28
11	I	178/180 (99%)	153 (86%)	25 (14%)	3 17
12	J	160/168 (95%)	135 (84%)	25 (16%)	2 13
13	K	86/136 (63%)	85 (99%)	1 (1%)	67 78
14	L	135/142 (95%)	104 (77%)	31 (23%)	0 4
15	M	104/108 (96%)	99 (95%)	5 (5%)	21 46
16	N	130/131 (99%)	112 (86%)	18 (14%)	3 17
17	O	105/119 (88%)	87 (83%)	18 (17%)	1 11
18	P	107/130 (82%)	102 (95%)	5 (5%)	22 47
19	Q	115/121 (95%)	104 (90%)	11 (10%)	7 25
20	R	118/122 (97%)	104 (88%)	14 (12%)	4 20
21	S	124/132 (94%)	118 (95%)	6 (5%)	21 46
22	T	115/116 (99%)	108 (94%)	7 (6%)	15 41
23	U	93/107 (87%)	87 (94%)	6 (6%)	14 39
24	V	66/67 (98%)	50 (76%)	16 (24%)	0 4
25	W	112/113 (99%)	91 (81%)	21 (19%)	1 8
26	X	113/115 (98%)	103 (91%)	10 (9%)	8 29
27	Y	108/112 (96%)	95 (88%)	13 (12%)	4 19
28	Z	64/103 (62%)	60 (94%)	4 (6%)	15 40
29	a	89/89 (100%)	76 (85%)	13 (15%)	2 15
30	b	74/74 (100%)	63 (85%)	11 (15%)	2 14
31	c	54/54 (100%)	51 (94%)	3 (6%)	17 43
32	d	48/48 (100%)	45 (94%)	3 (6%)	15 40
33	e	45/45 (100%)	36 (80%)	9 (20%)	1 6
34	f	65/65 (100%)	62 (95%)	3 (5%)	23 47

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
35	g	272/273 (100%)	257 (94%)	15 (6%)	18 44
36	h	23/23 (100%)	20 (87%)	3 (13%)	3 18
37	r	12/12 (100%)	11 (92%)	1 (8%)	9 32
38	w	35/35 (100%)	33 (94%)	2 (6%)	17 43
All	All	4247/4628 (92%)	3772 (89%)	475 (11%)	7 21

All (475) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	A	14	ASP
3	A	29	ASN
3	A	53	ARG
3	A	80	ARG
3	A	94	THR
3	A	111	GLN
3	A	112	ILE
3	A	120	ARG
3	A	130	ASP
3	A	131	HIS
3	A	136	GLU
3	A	138	SER
3	A	140	VAL
3	A	145	ILE
3	A	163	CYS
3	A	178	LEU
3	A	180	ARG
3	A	185	MET
3	A	186	ARG
3	A	188	THR
3	A	200	ASP
4	B	25	PHE
4	B	33	VAL
4	B	38	MET
4	B	77	ASP
4	B	79	VAL
4	B	95	ASN
4	B	98	THR
4	B	103	MET
4	B	106	THR
4	B	107	ARG
4	B	131	ASP

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Mol	Chain	Res	Type
4	B	136	ARG
4	B	146	ARG
4	B	163	GLN
4	B	169	MET
4	B	174	ARG
4	B	181	LEU
4	B	213	ARG
4	B	217	MET
5	C	73	MET
5	C	80	GLU
5	C	83	LEU
5	C	94	ILE
5	C	97	PHE
5	C	98	LEU
5	C	101	SER
5	C	112	VAL
5	C	113	GLN
5	C	120	GLN
5	C	121	ARG
5	C	123	ARG
5	C	125	LYS
5	C	132	ASP
5	C	134	ASN
5	C	143	CYS
5	C	147	VAL
5	C	156	ILE
5	C	157	LEU
5	C	160	LEU
5	C	161	SER
5	C	165	VAL
5	C	167	ARG
5	C	172	ASN
5	C	180	VAL
5	C	190	SER
5	C	196	ILE
5	C	204	ILE
5	C	212	LYS
5	C	215	MET
5	C	221	ASP
5	C	227	ARG
5	C	230	THR
5	C	232	THR

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Mol	Chain	Res	Type
5	C	236	PHE
5	C	240	THR
5	C	242	ASP
5	C	244	ILE
5	C	247	THR
5	C	249	SER
5	C	252	THR
5	C	260	VAL
5	C	271	ASP
5	C	276	THR
6	D	3	VAL
6	D	54	ARG
6	D	70	THR
6	D	126	ILE
6	D	134	CYS
6	D	146	ARG
6	D	152	PHE
6	D	164	VAL
6	D	176	LEU
6	D	195	THR
6	D	198	ILE
6	D	206	ASP
7	E	11	ARG
7	E	19	MET
7	E	23	LEU
7	E	29	PRO
7	E	38	LEU
7	E	39	ARG
7	E	40	GLU
7	E	42	LEU
7	E	45	ILE
7	E	49	ARG
7	E	51	ARG
7	E	59	ASP
7	E	77	ARG
7	E	88	ASP
7	E	95	THR
7	E	102	ILE
7	E	108	ARG
7	E	114	ILE
7	E	140	VAL
7	E	143	ASP

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Mol	Chain	Res	Type
7	E	145	ARG
7	E	151	ASP
7	E	160	ILE
7	E	169	ILE
7	E	171	ASP
7	E	181	CYS
7	E	191	ARG
7	E	198	ARG
7	E	204	SER
7	E	225	ILE
7	E	238	LEU
7	E	240	ARG
7	E	242	LYS
7	E	247	THR
7	E	248	ILE
8	F	68	ILE
8	F	82	ASN
8	F	91	ARG
8	F	122	ARG
8	F	130	ARG
8	F	134	VAL
8	F	140	ASP
8	F	166	ILE
8	F	176	GLU
8	F	204	ARG
9	G	16	ILE
9	G	19	ASP
9	G	20	ASP
9	G	51	ARG
9	G	52	ILE
9	G	57	ASP
9	G	67	VAL
9	G	69	THR
9	G	81	HIS
9	G	84	TYR
9	G	85	ARG
9	G	91	GLU
9	G	98	ARG
9	G	100	CYS
9	G	105	ASN
9	G	110	ASN
9	G	144	LEU

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Mol	Chain	Res	Type
9	G	151	ASP
9	G	152	ASP
9	G	181	THR
10	H	12	ASN
10	H	46	THR
10	H	51	ILE
10	H	70	LYS
10	H	75	ILE
10	H	84	GLU
10	H	87	PHE
10	H	105	THR
10	H	121	THR
10	H	122	LEU
10	H	123	THR
10	H	134	VAL
10	H	153	LEU
10	H	180	LEU
10	H	184	ASP
11	I	5	ARG
11	I	17	LYS
11	I	18	ARG
11	I	22	HIS
11	I	29	LEU
11	I	35	ASN
11	I	47	ARG
11	I	49	ARG
11	I	62	VAL
11	I	72	CYS
11	I	87	ASN
11	I	95	THR
11	I	106	SER
11	I	121	LEU
11	I	128	LYS
11	I	130	THR
11	I	144	LYS
11	I	170	LYS
11	I	175	ILE
11	I	177	SER
11	I	178	ARG
11	I	184	ARG
11	I	191	GLU
11	I	194	GLU

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Mol	Chain	Res	Type
11	I	196	GLU
12	J	3	VAL
12	J	12	THR
12	J	21	GLU
12	J	29	LEU
12	J	42	GLU
12	J	50	LEU
12	J	61	LEU
12	J	70	ARG
12	J	83	ARG
12	J	88	ASP
12	J	94	LEU
12	J	95	ASP
12	J	102	ILE
12	J	104	ASP
12	J	108	ARG
12	J	122	SER
12	J	128	VAL
12	J	131	ARG
12	J	132	GLN
12	J	136	ARG
12	J	144	ILE
12	J	150	ARG
12	J	153	SER
12	J	156	HIS
12	J	161	LEU
13	K	52	LEU
14	L	3	ASP
14	L	5	GLN
14	L	6	THR
14	L	13	GLN
14	L	15	THR
14	L	18	GLN
14	L	35	ARG
14	L	40	ILE
14	L	42	LEU
14	L	45	LYS
14	L	46	THR
14	L	48	LYS
14	L	52	GLU
14	L	60	CYS
14	L	69	ARG

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Mol	Chain	Res	Type
14	L	71	ARG
14	L	74	SER
14	L	76	VAL
14	L	78	THR
14	L	80	MET
14	L	83	GLN
14	L	85	THR
14	L	89	ARG
14	L	101	ARG
14	L	104	LYS
14	L	121	GLN
14	L	128	VAL
14	L	132	ARG
14	L	135	SER
14	L	144	LYS
14	L	146	THR
15	M	26	LEU
15	M	35	ILE
15	M	36	ARG
15	M	45	ARG
15	M	104	VAL
16	N	12	SER
16	N	14	SER
16	N	29	THR
16	N	62	GLN
16	N	71	ILE
16	N	75	LEU
16	N	77	SER
16	N	80	LEU
16	N	83	ASP
16	N	84	LEU
16	N	101	HIS
16	N	106	ARG
16	N	125	LEU
16	N	127	ARG
16	N	132	LYS
16	N	138	ASN
16	N	143	SER
16	N	145	THR
17	O	36	SER
17	O	45	THR
17	O	52	THR

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Mol	Chain	Res	Type
17	O	57	THR
17	O	67	ASP
17	O	70	SER
17	O	98	ARG
17	O	100	THR
17	O	103	ASN
17	O	105	THR
17	O	116	LEU
17	O	121	ARG
17	O	128	ARG
17	O	133	THR
17	O	137	SER
17	O	140	THR
17	O	146	ARG
17	O	150	ARG
18	P	44	ARG
18	P	51	ARG
18	P	78	THR
18	P	79	HIS
18	P	122	THR
19	Q	18	THR
19	Q	42	ILE
19	Q	43	GLU
19	Q	46	THR
19	Q	52	LEU
19	Q	121	VAL
19	Q	125	ARG
19	Q	130	LYS
19	Q	142	GLN
19	Q	143	LYS
19	Q	145	TYR
20	R	5	ARG
20	R	8	THR
20	R	17	ILE
20	R	34	VAL
20	R	35	CYS
20	R	78	ARG
20	R	83	ASN
20	R	85	VAL
20	R	101	ASP
20	R	124	VAL
20	R	126	MET

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Mol	Chain	Res	Type
20	R	127	ASN
20	R	128	PHE
20	R	132	ARG
21	S	4	VAL
21	S	14	ARG
21	S	19	ASN
21	S	71	MET
21	S	129	LEU
21	S	138	THR
22	T	27	LYS
22	T	56	ARG
22	T	67	ARG
22	T	78	ILE
22	T	83	GLN
22	T	87	VAL
22	T	131	LEU
23	U	36	CYS
23	U	55	ARG
23	U	61	LEU
23	U	68	THR
23	U	74	SER
23	U	115	THR
24	V	1	MET
24	V	2	GLN
24	V	4	ASP
24	V	7	GLU
24	V	9	VAL
24	V	15	ARG
24	V	18	SER
24	V	21	ASN
24	V	31	SER
24	V	34	MET
24	V	43	THR
24	V	62	MET
24	V	67	ASP
24	V	68	SER
24	V	70	LEU
24	V	76	ASP
25	W	4	MET
25	W	13	SER
25	W	14	ILE
25	W	23	ARG

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Mol	Chain	Res	Type
25	W	27	ILE
25	W	30	CYS
25	W	39	THR
25	W	40	VAL
25	W	47	ILE
25	W	49	GLU
25	W	56	HIS
25	W	57	ARG
25	W	80	ASP
25	W	83	LEU
25	W	85	ASP
25	W	97	ARG
25	W	104	LEU
25	W	105	THR
25	W	106	THR
25	W	107	SER
25	W	125	ILE
26	X	5	ARG
26	X	9	THR
26	X	14	ARG
26	X	15	SER
26	X	37	LYS
26	X	76	LYS
26	X	100	VAL
26	X	105	PHE
26	X	107	ARG
26	X	119	ARG
27	Y	5	VAL
27	Y	14	THR
27	Y	17	LEU
27	Y	23	MET
27	Y	29	HIS
27	Y	35	VAL
27	Y	42	GLU
27	Y	46	LYS
27	Y	54	VAL
27	Y	55	ILE
27	Y	94	HIS
27	Y	107	ARG
27	Y	117	VAL
28	Z	50	PHE
28	Z	65	TYR

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Mol	Chain	Res	Type
28	Z	88	LEU
28	Z	107	VAL
29	a	2	THR
29	a	6	ARG
29	a	7	ASN
29	a	17	HIS
29	a	18	VAL
29	a	21	ILE
29	a	29	CYS
29	a	43	ASN
29	a	53	ILE
29	a	64	LEU
29	a	72	HIS
29	a	78	VAL
29	a	81	SER
30	b	3	LEU
30	b	17	ARG
30	b	20	LYS
30	b	23	ARG
30	b	37	CYS
30	b	43	ILE
30	b	53	VAL
30	b	54	VAL
30	b	56	CYS
30	b	63	LEU
30	b	83	GLN
31	c	26	GLN
31	c	37	ASP
31	c	55	VAL
32	d	8	TRP
32	d	28	HIS
32	d	40	ARG
33	e	5	SER
33	e	8	ARG
33	e	11	LYS
33	e	12	VAL
33	e	27	LYS
33	e	29	THR
33	e	34	ARG
33	e	45	VAL
33	e	58	ASN
34	f	86	THR

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Mol	Chain	Res	Type
34	f	98	VAL
34	f	116	ARG
35	g	31	ILE
35	g	46	THR
35	g	65	PHE
35	g	74	ASP
35	g	96	THR
35	g	97	THR
35	g	102	VAL
35	g	110	SER
35	g	118	ARG
35	g	155	ARG
35	g	195	LEU
35	g	272	GLN
35	g	297	THR
35	g	306	LEU
35	g	309	VAL
36	h	9	ARG
36	h	14	LYS
36	h	23	ARG
37	r	162	ARG
38	w	91	MET
38	w	94	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (60) such sidechains are listed below:

Mol	Chain	Res	Type
3	A	111	GLN
3	A	132	GLN
3	A	141	ASN
4	B	40	ASN
4	B	159	GLN
5	C	178	HIS
6	D	56	GLN
6	D	74	GLN
6	D	174	HIS
6	D	179	GLN
7	E	8	HIS
7	E	112	HIS
7	E	179	ASN
7	E	214	ASN
7	E	216	ASN

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Mol	Chain	Res	Type
8	F	83	ASN
8	F	137	GLN
8	F	203	ASN
9	G	59	GLN
9	G	65	GLN
9	G	105	ASN
9	G	146	ASN
10	H	76	GLN
10	H	157	HIS
11	I	22	HIS
11	I	84	ASN
11	I	87	ASN
11	I	168	GLN
12	J	124	HIS
12	J	125	HIS
13	K	61	GLN
14	L	11	GLN
14	L	65	ASN
16	N	58	HIS
16	N	105	ASN
17	O	32	HIS
17	O	43	HIS
18	P	53	GLN
18	P	79	HIS
19	Q	24	HIS
19	Q	77	HIS
19	Q	142	GLN
21	S	72	GLN
21	S	101	ASN
26	X	31	HIS
26	X	61	GLN
26	X	63	ASN
27	Y	63	HIS
28	Z	46	ASN
28	Z	103	HIS
31	c	29	GLN
32	d	3	HIS
33	e	37	GLN
33	e	56	ASN
34	f	111	ASN
35	g	20	GLN
35	g	147	HIS

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Mol	Chain	Res	Type
35	g	178	ASN
38	w	95	ASN
38	w	96	GLN

5.3.3 RNA

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	2	1656/1868 (88%)	595 (35%)	83 (5%)
2	3	254/257 (98%)	148 (58%)	25 (9%)
All	All	1910/2125 (89%)	743 (38%)	108 (5%)

All (743) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	2	3	C
1	2	4	C
1	2	5	U
1	2	8	U
1	2	9	U
1	2	17	C
1	2	23	G
1	2	25	A
1	2	26	U
1	2	31	U
1	2	33	G
1	2	37	C
1	2	41	G
1	2	46	A
1	2	49	C
1	2	50	A
1	2	56	G
1	2	58	C
1	2	60	A
1	2	61	A
1	2	63	U
1	2	65	C
1	2	66	G
1	2	67	C
1	2	68	A
1	2	69	C
1	2	70	G

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Mol	Chain	Res	Type
1	2	71	G
1	2	72	C
1	2	75	G
1	2	76	U
1	2	77	A
1	2	78	C
1	2	79	A
1	2	81	U
1	2	102	A
1	2	103	A
1	2	104	A
1	2	110	U
1	2	111	A
1	2	113	G
1	2	114	G
1	2	115	U
1	2	116	U
1	2	123	G
1	2	124	U
1	2	125	C
1	2	126	G
1	2	127	C
1	2	129	C
1	2	130	G
1	2	141	A
1	2	142	C
1	2	143	U
1	2	144	U
1	2	150	A
1	2	153	G
1	2	154	U
1	2	155	G
1	2	163	U
1	2	167	G
1	2	168	C
1	2	170	A
1	2	173	A
1	2	175	A
1	2	179	C
1	2	181	A
1	2	182	C
1	2	184	G

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Mol	Chain	Res	Type
1	2	188	C
1	2	189	U
1	2	190	G
1	2	191	A
1	2	192	C
1	2	200	G
1	2	206	G
1	2	209	A
1	2	210	U
1	2	213	G
1	2	214	U
1	2	215	G
1	2	216	C
1	2	217	A
1	2	290	U
1	2	291	G
1	2	292	A
1	2	294	U
1	2	295	C
1	2	297	A
1	2	302	A
1	2	307	G
1	2	308	G
1	2	310	C
1	2	311	C
1	2	312	G
1	2	315	C
1	2	317	C
1	2	319	C
1	2	320	G
1	2	321	C
1	2	332	G
1	2	333	G
1	2	334	C
1	2	335	G
1	2	336	A
1	2	338	G
1	2	339	A
1	2	342	C
1	2	347	G
1	2	351	G
1	2	360	A

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Mol	Chain	Res	Type
1	2	362	C
1	2	364	A
1	2	368	U
1	2	369	C
1	2	370	G
1	2	377	G
1	2	381	C
1	2	382	C
1	2	383	G
1	2	384	U
1	2	385	G
1	2	386	C
1	2	398	A
1	2	400	C
1	2	407	G
1	2	408	A
1	2	409	C
1	2	417	C
1	2	418	A
1	2	421	G
1	2	425	G
1	2	426	A
1	2	427	U
1	2	434	G
1	2	438	G
1	2	441	C
1	2	447	A
1	2	448	A
1	2	450	C
1	2	453	C
1	2	454	U
1	2	464	A
1	2	465	A
1	2	466	G
1	2	471	G
1	2	472	C
1	2	473	A
1	2	474	G
1	2	476	A
1	2	482	G
1	2	485	A
1	2	487	U

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Mol	Chain	Res	Type
1	2	489	A
1	2	492	C
1	2	496	C
1	2	500	A
1	2	502	C
1	2	507	G
1	2	508	A
1	2	509	G
1	2	523	A
1	2	530	U
1	2	531	A
1	2	532	C
1	2	534	G
1	2	535	G
1	2	536	A
1	2	537	C
1	2	542	U
1	2	544	G
1	2	546	G
1	2	548	C
1	2	550	C
1	2	552	G
1	2	554	A
1	2	555	A
1	2	556	U
1	2	559	G
1	2	562	U
1	2	563	G
1	2	564	A
1	2	568	C
1	2	570	C
1	2	576	A
1	2	583	A
1	2	585	C
1	2	587	A
1	2	588	G
1	2	589	G
1	2	590	A
1	2	591	U
1	2	593	C
1	2	594	A
1	2	595	U

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Mol	Chain	Res	Type
1	2	596	U
1	2	598	G
1	2	601	G
1	2	602	G
1	2	603	C
1	2	604	A
1	2	605	A
1	2	606	G
1	2	607	U
1	2	608	C
1	2	614	C
1	2	615	C
1	2	616	A
1	2	617	G
1	2	618	C
1	2	621	C
1	2	626	G
1	2	627	U
1	2	628	A
1	2	629	A
1	2	631	U
1	2	632	C
1	2	638	C
1	2	639	C
1	2	640	A
1	2	643	A
1	2	644	G
1	2	647	U
1	2	657	U
1	2	658	U
1	2	659	G
1	2	660	C
1	2	668	A
1	2	669	A
1	2	670	A
1	2	671	A
1	2	672	A
1	2	673	G
1	2	683	G
1	2	684	G
1	2	685	A
1	2	686	U

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Mol	Chain	Res	Type
1	2	687	C
1	2	688	U
1	2	748	C
1	2	749	U
1	2	750	C
1	2	751	G
1	2	792	C
1	2	793	G
1	2	794	A
1	2	796	G
1	2	797	C
1	2	798	G
1	2	799	U
1	2	807	G
1	2	808	A
1	2	809	A
1	2	810	A
1	2	811	A
1	2	812	A
1	2	818	A
1	2	821	G
1	2	822	U
1	2	823	U
1	2	824	C
1	2	830	A
1	2	834	C
1	2	842	C
1	2	843	C
1	2	845	G
1	2	847	A
1	2	852	G
1	2	856	C
1	2	861	A
1	2	869	A
1	2	870	A
1	2	871	U
1	2	872	A
1	2	873	G
1	2	877	C
1	2	878	G
1	2	880	G
1	2	881	G

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Mol	Chain	Res	Type
1	2	882	U
1	2	887	U
1	2	888	U
1	2	890	U
1	2	898	U
1	2	903	A
1	2	909	G
1	2	913	A
1	2	914	U
1	2	917	U
1	2	918	U
1	2	919	A
1	2	920	A
1	2	922	A
1	2	926	A
1	2	931	C
1	2	933	G
1	2	934	G
1	2	938	A
1	2	943	U
1	2	954	U
1	2	959	G
1	2	962	A
1	2	968	U
1	2	969	U
1	2	970	G
1	2	971	G
1	2	978	G
1	2	980	A
1	2	981	A
1	2	983	A
1	2	985	G
1	2	990	A
1	2	992	A
1	2	996	A
1	2	997	A
1	2	999	G
1	2	1001	A
1	2	1008	A
1	2	1009	A
1	2	1017	U
1	2	1023	A

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Mol	Chain	Res	Type
1	2	1030	A
1	2	1033	G
1	2	1040	G
1	2	1041	G
1	2	1042	A
1	2	1045	U
1	2	1049	A
1	2	1053	C
1	2	1054	G
1	2	1060	A
1	2	1061	U
1	2	1067	C
1	2	1078	C
1	2	1083	A
1	2	1085	C
1	2	1087	A
1	2	1088	U
1	2	1089	G
1	2	1096	G
1	2	1099	G
1	2	1100	A
1	2	1110	G
1	2	1111	U
1	2	1112	U
1	2	1114	U
1	2	1116	C
1	2	1119	A
1	2	1121	G
1	2	1122	A
1	2	1123	C
1	2	1124	C
1	2	1130	G
1	2	1131	G
1	2	1133	A
1	2	1137	U
1	2	1138	C
1	2	1139	C
1	2	1143	A
1	2	1148	A
1	2	1150	A
1	2	1153	C
1	2	1154	U

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Mol	Chain	Res	Type
1	2	1157	G
1	2	1171	G
1	2	1181	A
1	2	1182	A
1	2	1194	A
1	2	1195	A
1	2	1202	U
1	2	1207	G
1	2	1208	A
1	2	1211	G
1	2	1213	C
1	2	1215	C
1	2	1216	C
1	2	1217	A
1	2	1221	G
1	2	1224	G
1	2	1227	G
1	2	1232	U
1	2	1233	G
1	2	1235	G
1	2	1238	U
1	2	1242	U
1	2	1243	U
1	2	1248	U
1	2	1249	C
1	2	1250	A
1	2	1251	A
1	2	1253	A
1	2	1254	C
1	2	1256	G
1	2	1257	G
1	2	1259	A
1	2	1260	A
1	2	1261	C
1	2	1266	C
1	2	1274	G
1	2	1275	G
1	2	1283	C
1	2	1284	A
1	2	1285	G
1	2	1286	G
1	2	1288	U

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Mol	Chain	Res	Type
1	2	1298	G
1	2	1301	A
1	2	1302	G
1	2	1303	C
1	2	1308	U
1	2	1309	C
1	2	1313	A
1	2	1315	U
1	2	1317	C
1	2	1320	G
1	2	1321	G
1	2	1322	G
1	2	1326	U
1	2	1327	G
1	2	1330	G
1	2	1331	C
1	2	1343	U
1	2	1344	A
1	2	1348	G
1	2	1358	U
1	2	1364	U
1	2	1366	G
1	2	1367	U
1	2	1371	U
1	2	1372	U
1	2	1373	C
1	2	1377	U
1	2	1378	A
1	2	1380	C
1	2	1381	G
1	2	1382	A
1	2	1385	G
1	2	1401	A
1	2	1404	U
1	2	1405	A
1	2	1406	G
1	2	1416	C
1	2	1426	U
1	2	1427	C
1	2	1428	G
1	2	1429	G
1	2	1430	C

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Mol	Chain	Res	Type
1	2	1431	G
1	2	1432	U
1	2	1439	A
1	2	1441	U
1	2	1442	U
1	2	1444	U
1	2	1446	A
1	2	1448	A
1	2	1452	A
1	2	1454	A
1	2	1455	A
1	2	1462	U
1	2	1463	U
1	2	1464	C
1	2	1465	A
1	2	1466	G
1	2	1468	C
1	2	1473	G
1	2	1474	A
1	2	1477	U
1	2	1478	U
1	2	1483	A
1	2	1486	A
1	2	1487	A
1	2	1489	A
1	2	1490	G
1	2	1493	C
1	2	1494	U
1	2	1495	G
1	2	1499	U
1	2	1500	G
1	2	1505	U
1	2	1507	G
1	2	1508	A
1	2	1510	G
1	2	1512	C
1	2	1515	G
1	2	1516	G
1	2	1518	C
1	2	1519	U
1	2	1520	G
1	2	1521	C

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Mol	Chain	Res	Type
1	2	1523	C
1	2	1524	G
1	2	1526	G
1	2	1533	A
1	2	1535	U
1	2	1536	G
1	2	1543	U
1	2	1545	A
1	2	1548	G
1	2	1559	C
1	2	1560	U
1	2	1561	A
1	2	1563	G
1	2	1566	G
1	2	1567	G
1	2	1568	C
1	2	1572	C
1	2	1573	G
1	2	1574	C
1	2	1578	U
1	2	1579	A
1	2	1580	A
1	2	1581	C
1	2	1585	U
1	2	1586	U
1	2	1587	G
1	2	1588	A
1	2	1598	G
1	2	1599	U
1	2	1600	G
1	2	1601	A
1	2	1602	U
1	2	1603	G
1	2	1604	G
1	2	1606	G
1	2	1610	G
1	2	1612	G
1	2	1617	G
1	2	1618	C
1	2	1621	U
1	2	1623	A
1	2	1625	U

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Mol	Chain	Res	Type
1	2	1630	A
1	2	1632	G
1	2	1634	A
1	2	1641	A
1	2	1645	C
1	2	1648	G
1	2	1649	U
1	2	1650	A
1	2	1654	G
1	2	1660	C
1	2	1663	A
1	2	1664	A
1	2	1665	G
1	2	1671	G
1	2	1675	A
1	2	1678	A
1	2	1682	C
1	2	1683	C
1	2	1688	C
1	2	1689	C
1	2	1695	A
1	2	1699	A
1	2	1721	U
1	2	1722	G
1	2	1728	U
1	2	1729	U
1	2	1737	G
1	2	1742	C
1	2	1744	G
1	2	1745	A
1	2	1746	U
1	2	1761	U
1	2	1777	G
1	2	1778	C
1	2	1779	G
1	2	1783	C
1	2	1784	G
1	2	1785	C
1	2	1786	U
1	2	1800	A
1	2	1805	G
1	2	1807	C

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Mol	Chain	Res	Type
1	2	1815	A
1	2	1826	G
1	2	1829	G
1	2	1831	A
1	2	1835	A
1	2	1836	G
1	2	1838	U
1	2	1839	U
1	2	1841	C
1	2	1849	G
1	2	1851	A
1	2	1852	C
1	2	1855	G
1	2	1859	A
1	2	1860	A
1	2	1861	G
1	2	1862	G
1	2	1863	A
1	2	1865	C
1	2	1867	U
1	2	1868	U
1	2	1869	A
2	3	41	U
2	3	42	C
2	3	43	C
2	3	44	C
2	3	45	C
2	3	46	U
2	3	47	G
2	3	48	U
2	3	49	G
2	3	52	G
2	3	55	C
2	3	57	A
2	3	58	C
2	3	59	U
2	3	61	U
2	3	62	C
2	3	63	U
2	3	65	C
2	3	66	A
2	3	68	G

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Mol	Chain	Res	Type
2	3	70	A
2	3	71	G
2	3	72	A
2	3	73	A
2	3	74	A
2	3	75	G
2	3	78	U
2	3	83	C
2	3	84	C
2	3	85	A
2	3	86	U
2	3	87	G
2	3	92	U
2	3	93	A
2	3	95	U
2	3	96	A
2	3	97	U
2	3	99	A
2	3	100	G
2	3	101	U
2	3	102	G
2	3	106	U
2	3	107	G
2	3	108	C
2	3	109	A
2	3	111	C
2	3	113	U
2	3	114	C
2	3	115	C
2	3	116	A
2	3	117	G
2	3	118	G
2	3	120	C
2	3	121	C
2	3	122	C
2	3	123	C
2	3	124	C
2	3	128	C
2	3	129	C
2	3	131	G
2	3	135	G
2	3	137	G

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Mol	Chain	Res	Type
2	3	139	C
2	3	140	A
2	3	141	U
2	3	142	A
2	3	145	G
2	3	147	U
2	3	150	G
2	3	152	G
2	3	153	G
2	3	154	A
2	3	155	A
2	3	159	G
2	3	160	U
2	3	161	G
2	3	162	A
2	3	163	G
2	3	164	U
2	3	165	A
2	3	166	C
2	3	167	A
2	3	169	C
2	3	172	A
2	3	175	U
2	3	176	G
2	3	228	U
2	3	229	G
2	3	231	G
2	3	232	C
2	3	233	G
2	3	234	U
2	3	235	G
2	3	236	C
2	3	237	C
2	3	242	C
2	3	243	A
2	3	244	A
2	3	245	G
2	3	246	A
2	3	247	C
2	3	249	G
2	3	251	U
2	3	252	A

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Mol	Chain	Res	Type
2	3	253	G
2	3	254	C
2	3	255	C
2	3	256	G
2	3	257	A
2	3	258	G
2	3	259	U
2	3	264	U
2	3	265	U
2	3	266	G
2	3	267	G
2	3	269	U
2	3	270	C
2	3	274	A
2	3	278	G
2	3	280	C
2	3	281	U
2	3	282	U
2	3	283	G
2	3	284	U
2	3	285	G
2	3	288	A
2	3	290	U
2	3	291	G
2	3	297	U
2	3	303	G
2	3	304	C
2	3	306	U
2	3	307	G
2	3	308	C
2	3	310	A
2	3	311	G
2	3	321	A
2	3	322	G
2	3	324	U
2	3	325	C
2	3	328	G
2	3	330	A
2	3	331	G
2	3	332	A
2	3	333	C
2	3	334	C

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Mol	Chain	Res	Type
2	3	340	C
2	3	341	C

All (108) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	2	2	A
1	2	60	A
1	2	65	C
1	2	102	A
1	2	114	G
1	2	126	G
1	2	143	U
1	2	180	G
1	2	291	G
1	2	314	U
1	2	319	C
1	2	332	G
1	2	368	U
1	2	381	C
1	2	382	C
1	2	408	A
1	2	437	G
1	2	440	G
1	2	453	C
1	2	465	A
1	2	547	G
1	2	554	A
1	2	590	A
1	2	594	A
1	2	601	G
1	2	604	A
1	2	615	C
1	2	620	G
1	2	657	U
1	2	670	A
1	2	748	C
1	2	750	C
1	2	793	G
1	2	797	C
1	2	811	A
1	2	870	A

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Mol	Chain	Res	Type
1	2	917	U
1	2	920	A
1	2	926	A
1	2	958	G
1	2	980	A
1	2	996	A
1	2	1001	A
1	2	1060	A
1	2	1129	G
1	2	1137	U
1	2	1165	G
1	2	1180	C
1	2	1181	A
1	2	1231	C
1	2	1250	A
1	2	1253	A
1	2	1302	G
1	2	1308	U
1	2	1316	C
1	2	1321	G
1	2	1330	G
1	2	1342	U
1	2	1403	C
1	2	1404	U
1	2	1425	G
1	2	1428	G
1	2	1430	C
1	2	1438	A
1	2	1440	C
1	2	1445	U
1	2	1464	C
1	2	1476	A
1	2	1493	C
1	2	1494	U
1	2	1511	U
1	2	1534	C
1	2	1542	C
1	2	1558	C
1	2	1585	U
1	2	1587	G
1	2	1601	A
1	2	1648	G

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Mol	Chain	Res	Type
1	2	1649	U
1	2	1745	A
1	2	1783	C
1	2	1835	A
1	2	1838	U
2	3	48	U
2	3	61	U
2	3	62	C
2	3	65	C
2	3	77	G
2	3	98	G
2	3	99	A
2	3	116	A
2	3	123	C
2	3	136	A
2	3	160	U
2	3	163	G
2	3	230	G
2	3	243	A
2	3	244	A
2	3	245	G
2	3	252	A
2	3	254	C
2	3	257	A
2	3	280	C
2	3	281	U
2	3	289	C
2	3	306	U
2	3	329	U
2	3	330	A

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 oligosaccharides in this entry.

5.6 Ligand geometry

Of 101 ligands modelled in this entry, 101 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

The following chains have linkage breaks:

Mol	Chain	Number of breaks
2	3	2

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	3	177:C	O3'	222:G	P	17.37
1	3	334:C	O3'	339:A	P	15.84

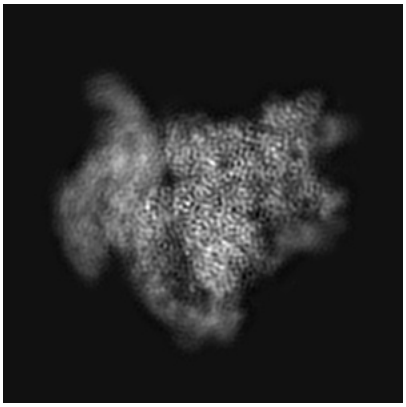
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-3019. These allow visual inspection of the internal detail of the map and identification of artifacts.

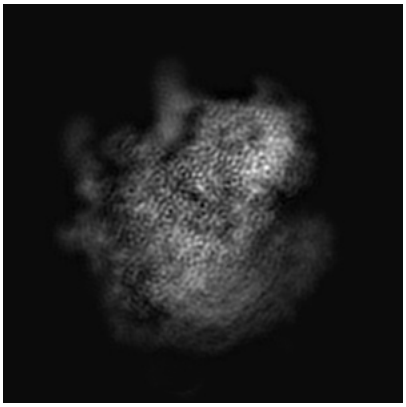
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections

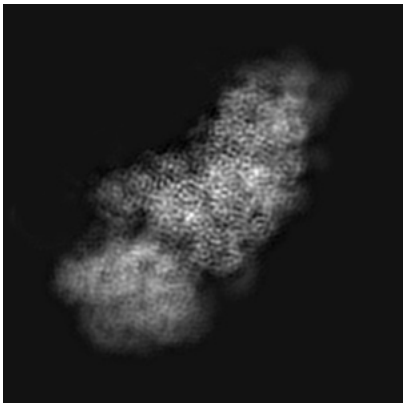
6.1.1 Primary map



X



Y

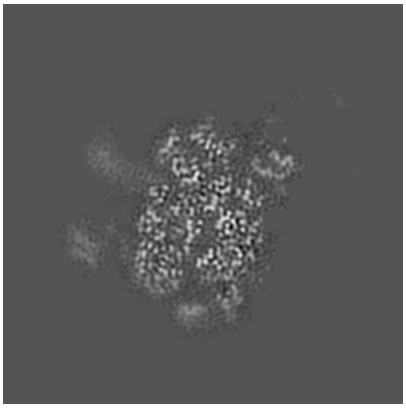


Z

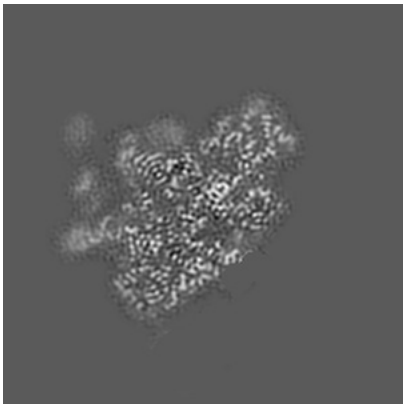
The images above show the map projected in three orthogonal directions.

6.2 Central slices

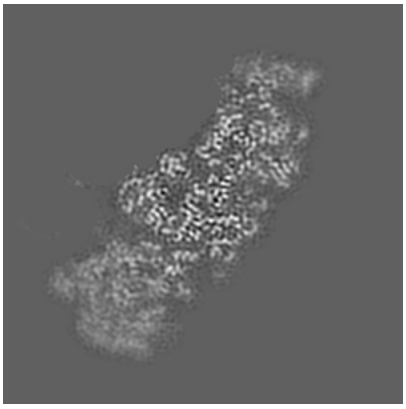
6.2.1 Primary map



X Index: 108



Y Index: 108

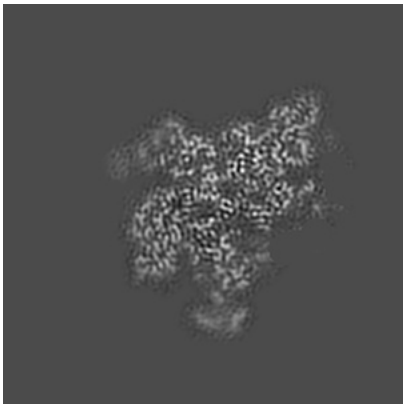


Z Index: 108

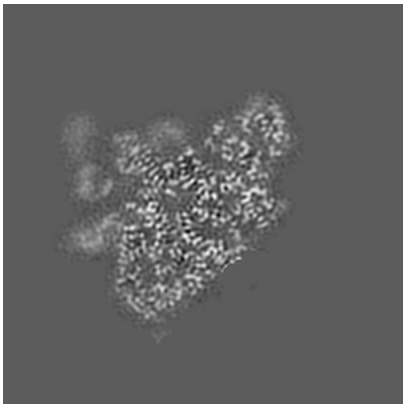
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

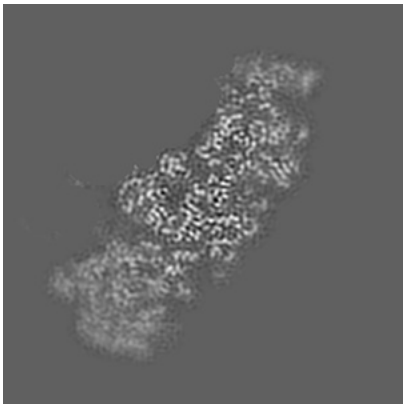
6.3.1 Primary map



X Index: 122



Y Index: 111

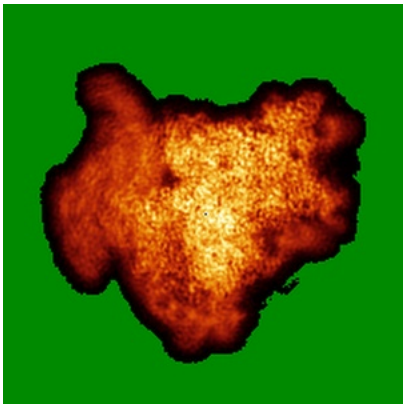


Z Index: 108

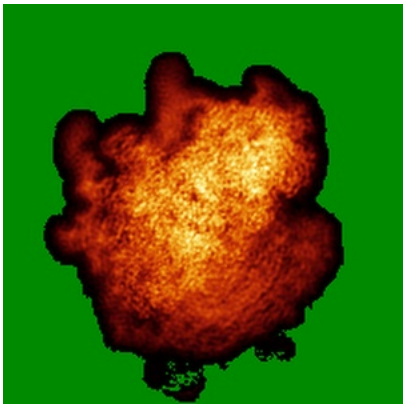
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) (i)

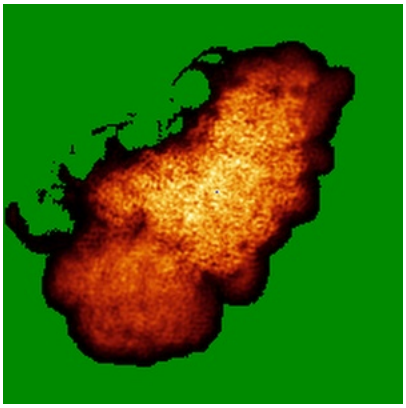
6.4.1 Primary map



X



Y

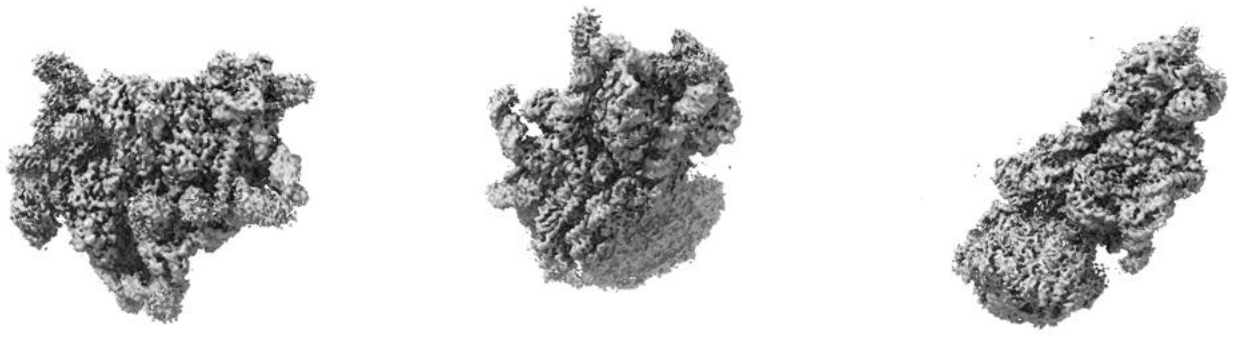


Z

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



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.05. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

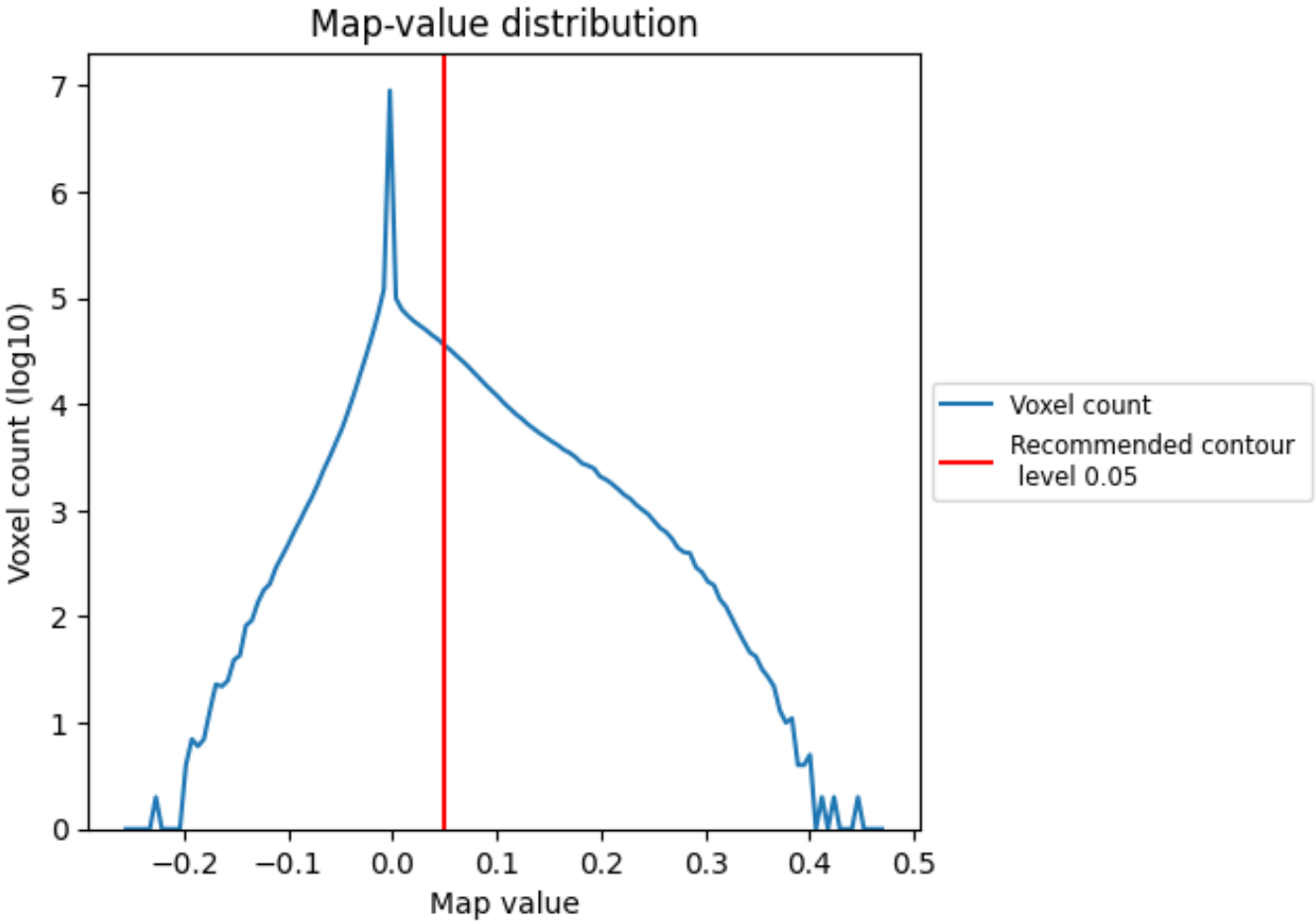
6.6 Mask visualisation (i)

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

7 Map analysis

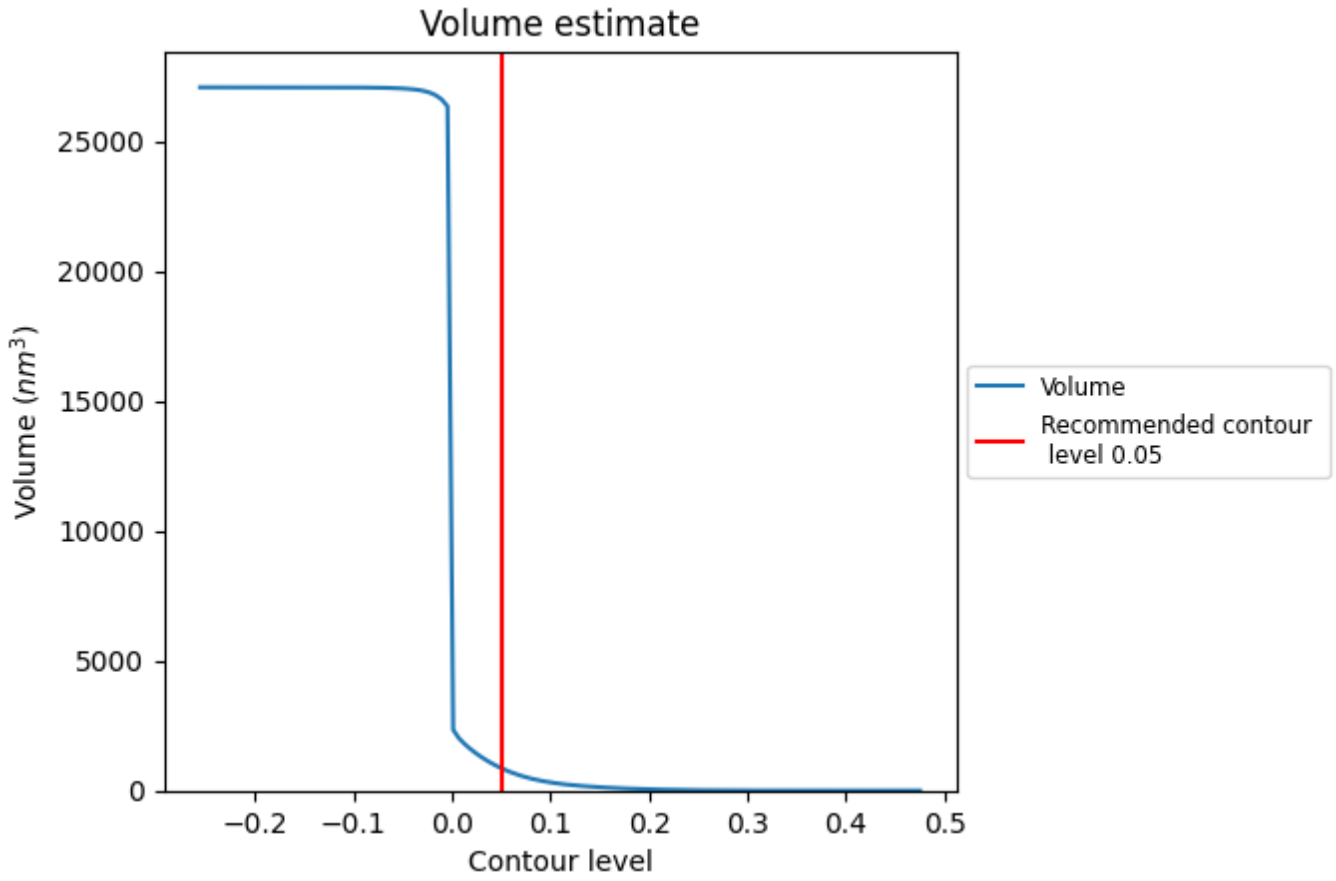
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



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.

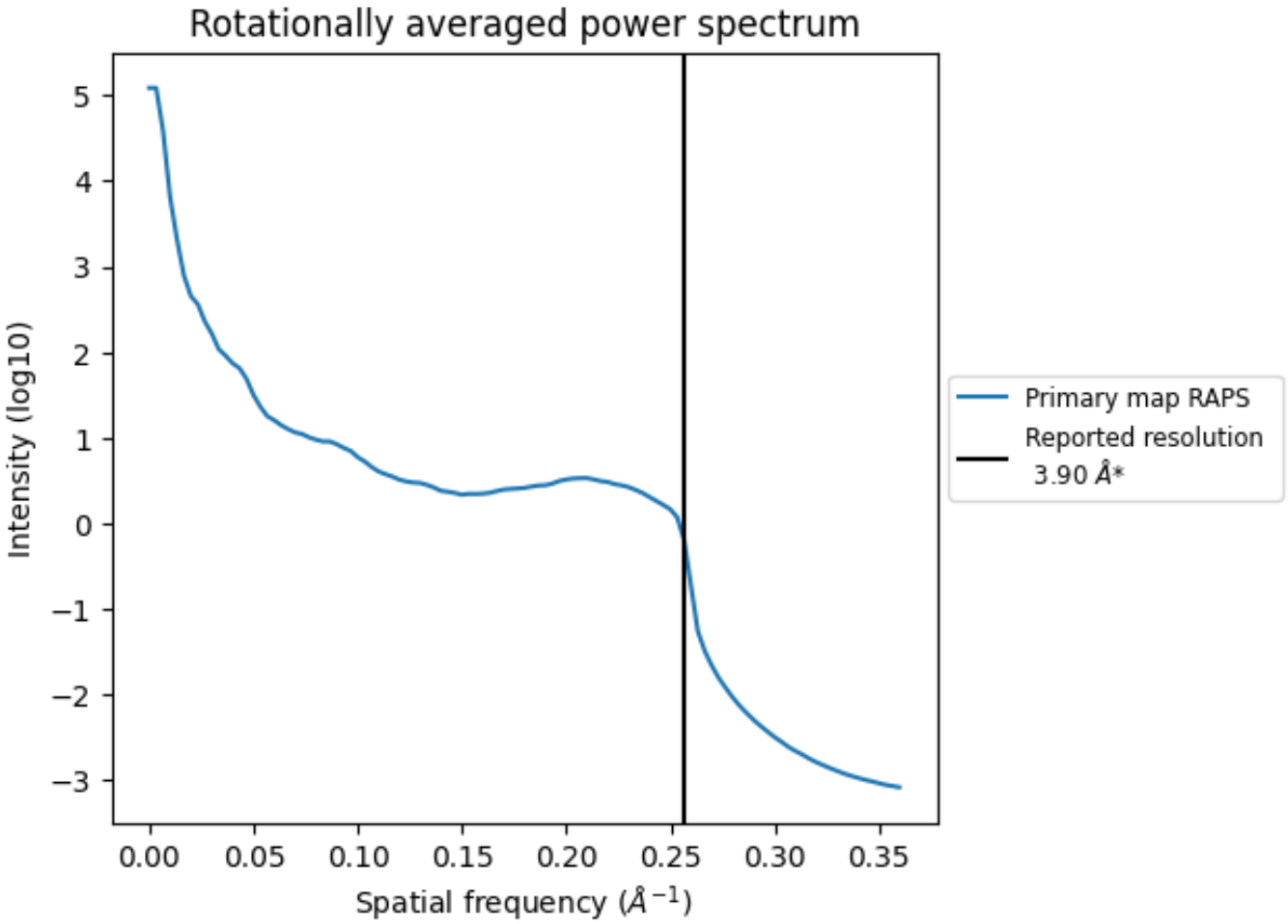
7.2 Volume estimate



The volume at the recommended contour level is 862 nm^3; this corresponds to an approximate mass of 779 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 0.256 Å^{-1}

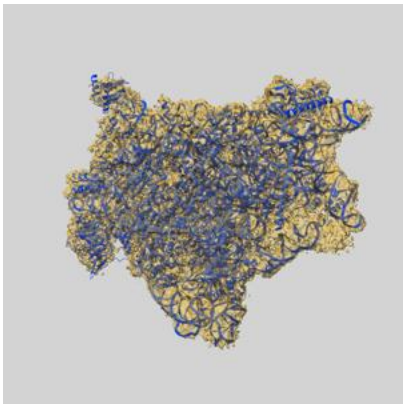
8 Fourier-Shell correlation

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

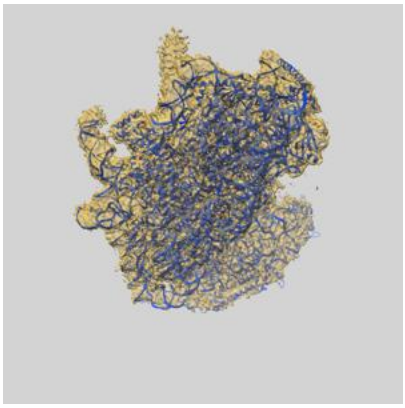
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-3019 and PDB model 5A2Q. Per-residue inclusion information can be found in section 3 on page 12.

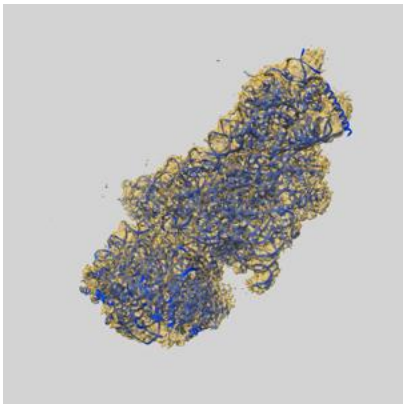
9.1 Map-model overlay



X



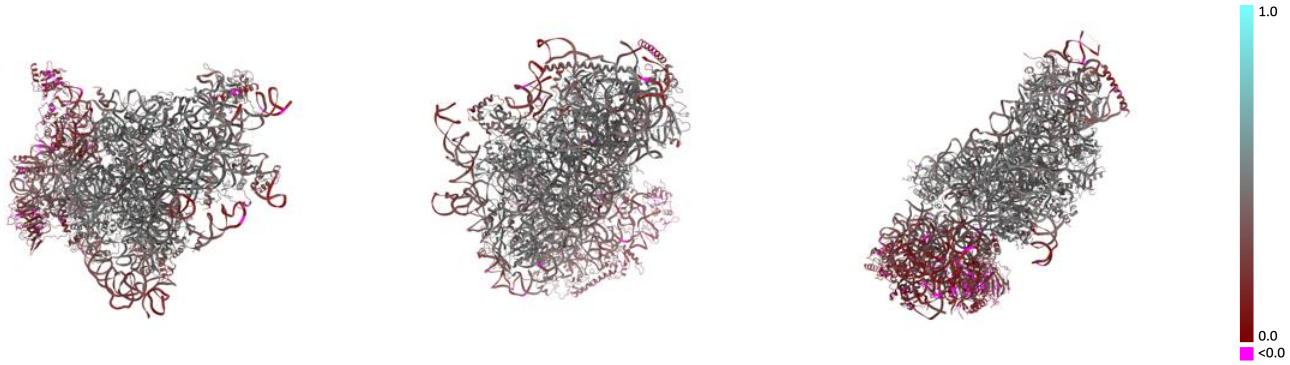
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.05 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.

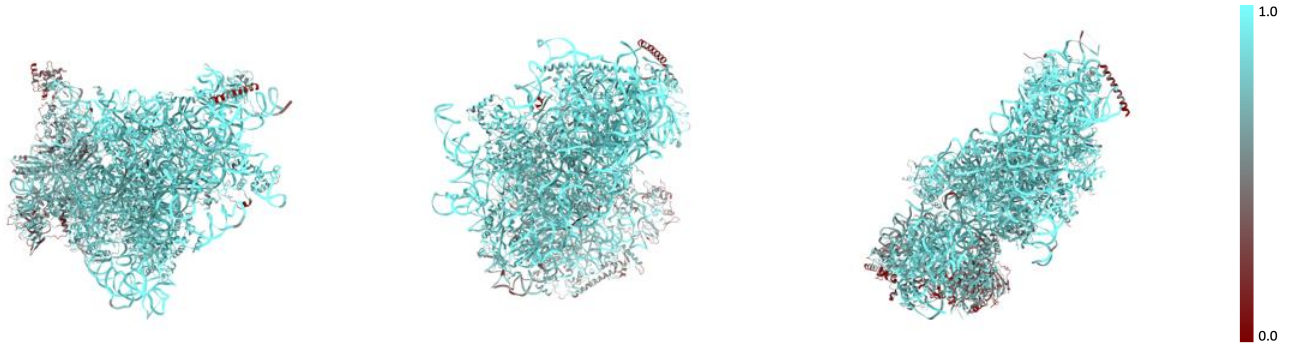
9.2 Q-score mapped to coordinate model (i)



X Y Z

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.

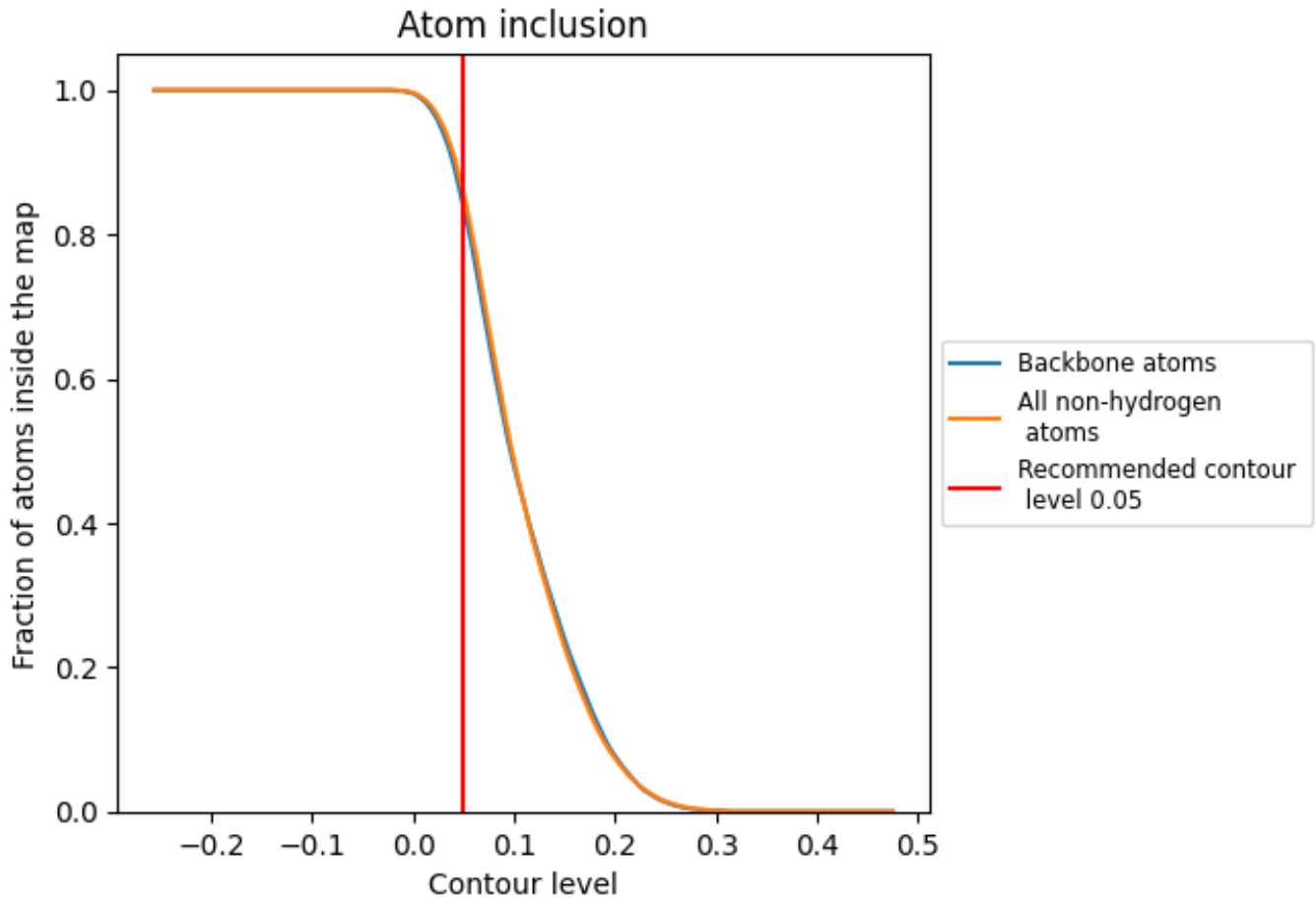
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

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 (0.05).

9.4 Atom inclusion (i)



At the recommended contour level, 84% of all backbone atoms, 86% 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 (0.05) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8570	0.3750
2	0.9530	0.3930
3	0.8210	0.2730
A	0.8920	0.4550
B	0.8490	0.4580
C	0.8990	0.4720
D	0.6410	0.2630
E	0.9140	0.4800
F	0.7380	0.3740
G	0.8880	0.4380
H	0.8410	0.4090
I	0.8740	0.4440
J	0.9060	0.4580
K	0.6030	0.1970
L	0.8550	0.4700
M	0.3990	0.1030
N	0.8870	0.4750
O	0.8730	0.4670
P	0.5910	0.1630
Q	0.7620	0.3140
R	0.7320	0.3720
S	0.5980	0.2170
T	0.7000	0.2140
U	0.7320	0.2800
V	0.9020	0.4610
W	0.9130	0.4870
X	0.8900	0.4850
Y	0.9170	0.4680
Z	0.6580	0.3220
a	0.8570	0.4770
b	0.9060	0.4710
c	0.7420	0.4130
d	0.7710	0.2390
e	0.7750	0.4290
f	0.3260	0.0900

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Chain	Atom inclusion	Q-score
g	0.6250	0.2040
h	0.7520	0.4390
r	0.7680	0.3440
w	0.4070	0.2600