



Full wwPDB EM Validation Report ⓘ

Nov 3, 2024 – 12:22 AM EDT

PDB ID : 6VYT
EMDB ID : EMD-21471
Title : Escherichia coli transcription-translation complex A2 (TTC-A2) containing a 15 nt long mRNA spacer, NusG, and fMet-tRNAs at P-site and E-site
Authors : Molodtsov, V.; Wang, C.; Ebright, R.H.; Su, M.
Deposited on : 2020-02-27
Resolution : 14.00 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:

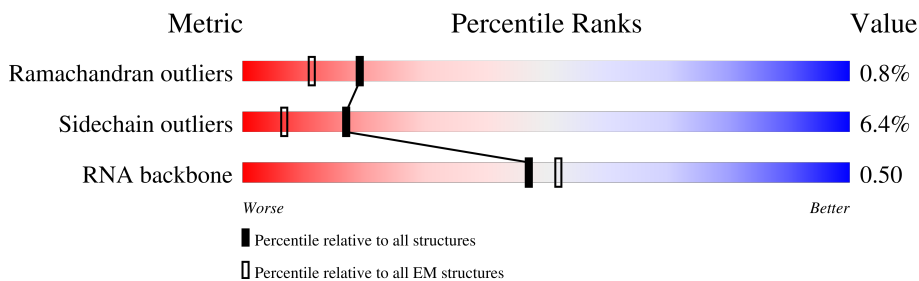
EMDB validation analysis : 0.0.1.dev113
MolProbity : 4.02b-467
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 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 14.00 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	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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	0	103	
2	1	110	
3	2	100	
4	3	104	
5	4	94	
6	5	36	
7	6	36	
8	7	32	

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Mol	Chain	Length	Quality of chain
9	A	76	58% 58% 38% .
9	B	76	45% 46% 49% 5%
10	AA	1342	38% 89% 8% ..
11	AB	181	15% 53% . 46%
12	AC	329	45% 64% 5% 30%
12	AD	329	19% 68% . 31%
13	AE	1407	31% 89% 5% . 5%
14	C	66	6% 97% .
15	D	1542	18% 78% 20% ..
16	E	87	36% 93% 6% .
17	F	71	77% 94% . .
18	G	241	28% 90% . 7%
19	H	557	36% 41% . . 54%
20	I	233	53% 86% . 11%
21	J	206	38% 96% .
22	K	167	38% 89% 5% 7%
23	L	135	. 72% . . 23%
24	M	179	23% 80% . . 16%
25	N	130	32% 97% ..
26	O	130	38% 93% 5% .
27	P	103	50% 87% 9% .
28	Q	129	19% 87% . 9%
29	R	124	57% 92% 6% .
30	S	101	37% 95% . .
31	T	89	9% 85% 13% .

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Mol	Chain	Length	Quality of chain
32	U	82	33% 94% 6%
33	V	84	39% 93% 5%
34	W	92	15% 86% 10%
35	X	118	25% 88% 10%
36	Y	3	100% 67%
37	a	2904	24% 81% 18%
38	b	85	22% 88% 11%
39	c	78	54% 94% 5%
40	d	120	37% 86% 14%
41	e	63	24% 97%
42	f	59	71% 95%
43	g	70	30% 86% 9% 6%
44	h	273	58% 93% 7%
45	i	57	28% 88% 11%
46	j	209	37% 97%
47	k	55	27% 89% 5% 5%
48	l	201	50% 93% 7%
49	m	46	43% 93% 7%
50	n	179	34% 89% 10%
51	o	65	69% 91% 8%
52	p	177	7% 97%
53	q	38	34% 95% 5%
54	r	149	84% 93% 7%
55	s	142	65% 96%
56	t	123	60% 95% 5%

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Mol	Chain	Length	Quality of chain
57	u	144	
58	v	136	
59	w	127	
60	x	117	
61	y	115	
62	z	118	

2 Entry composition [i](#)

There are 64 unique types of molecules in this entry. The entry contains 298128 atoms, of which 124824 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called 50S ribosomal protein L21.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
1	0	103	1655	516	839	153	145	2	0	0

- Molecule 2 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
2	1	110	1779	532	922	166	156	3	0	0

- Molecule 3 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
3	2	94	1557	470	811	140	134	2	0	0

- Molecule 4 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	H	N	O		
4	3	103	1632	498	844	148	142	0	0

- Molecule 5 is a protein called 50S ribosomal protein L25.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
5	4	94	1533	479	780	137	134	3	0	0

- Molecule 6 is a DNA chain called NT DNA.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			P
6	5	23	732	225	260	87	137	23	0	0

- Molecule 7 is a DNA chain called T DNA.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	P		
7	6	27	847	259	305	89	167	27	0	0

- Molecule 8 is a RNA chain called mRNA with a 15 nt long spacer.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	P		
8	7	16	515	154	168	62	115	16	0	0

- Molecule 9 is a RNA chain called E-site and P-site tRNA (fMet).

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	P		
9	A	76	2446	723	826	295	527	75	0	0
9	B	76	2433	723	813	295	527	75	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	?	-	U	deletion	GB 1847035720
B	?	-	U	deletion	GB 1847035720

- Molecule 10 is a protein called DNA-directed RNA polymerase subunit beta.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
10	AA	1322	20851	6539	10426	1817	2026	43	0	0

- Molecule 11 is a protein called Transcription termination/antitermination protein NusG.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
11	AB	98	1573	505	783	139	140	6	0	0

- Molecule 12 is a protein called DNA-directed RNA polymerase subunit alpha.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
12	AC	230	3599	1112	1813	317	351	6	0	0

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Mol	Chain	Residues	Atoms					AltConf	Trace	
12	AD	228	Total	C	H	N	O	S	0	0
			3556	1100	1789	312	349	6		

- Molecule 13 is a protein called DNA-directed RNA polymerase subunit beta'.

Mol	Chain	Residues	Atoms					AltConf	Trace	
13	AE	1335	Total	C	H	N	O	S	0	0
			21000	6526	10612	1854	1958	50		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
AE	1384	VAL	MET	variant	UNP A0A4S1NBU2

- Molecule 14 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace	
14	C	66	Total	C	H	N	O	S	0	0
			1103	344	559	102	97	1		

- Molecule 15 is a RNA chain called 16S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace	
15	D	1524	Total	C	H	N	O	P	0	0
			49126	14585	16423	6003	10591	1524		

- Molecule 16 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace	
16	E	86	Total	C	H	N	O	S	0	0
			1388	414	719	138	114	3		

- Molecule 17 is a protein called 30S ribosomal protein S21.

Mol	Chain	Residues	Atoms					AltConf	Trace	
17	F	70	Total	C	H	N	O	S	0	0
			1218	366	629	125	97	1		

- Molecule 18 is a protein called 30S ribosomal protein S2.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
18	G	225	3545	1113	1785	316	323	8	0	0

- Molecule 19 is a protein called 30S ribosomal protein S1.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
19	H	259	3184	1073	1454	305	349	3	0	0

- Molecule 20 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
20	I	208	3346	1036	1710	307	290	3	0	0

- Molecule 21 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
21	J	205	3350	1026	1707	315	298	4	0	0

- Molecule 22 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
22	K	156	2348	717	1196	217	212	6	0	0

- Molecule 23 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
23	L	104	1694	536	846	153	152	7	0	0

- Molecule 24 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
24	M	151	2416	735	1235	227	215	4	0	0

- Molecule 25 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace	
25	N	129	Total	C	H	N	O	S	0	0
			2010	616	1031	173	184	6		

- Molecule 26 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms					AltConf	Trace	
26	O	127	Total	C	H	N	O	S	0	0
			2092	634	1070	206	179	3		

- Molecule 27 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace	
27	P	99	Total	C	H	N	O	S	0	0
			1621	495	831	151	143	1		

- Molecule 28 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace	
28	Q	117	Total	C	H	N	O	S	0	0
			1764	540	887	174	160	3		

- Molecule 29 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace	
29	R	121	Total	C	H	N	O	S	0	0
			1940	580	1001	194	161	4		

- Molecule 30 is a protein called 30S ribosomal protein S14.

Mol	Chain	Residues	Atoms					AltConf	Trace	
30	S	100	Total	C	H	N	O	S	0	0
			1649	499	844	164	139	3		

- Molecule 31 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace	
31	T	88	Total	C	H	N	O	S	0	0
			1448	439	734	144	130	1		

- Molecule 32 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
32	U	82	1315	406	666	128	114	1	0	0

- Molecule 33 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
33	V	80	1339	411	691	121	113	3	0	0

- Molecule 34 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
34	W	83	1351	424	688	126	111	2	0	0

- Molecule 35 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
35	X	116	1864	558	964	181	158	3	0	0

- Molecule 36 is a RNA chain called mRNA in the ribosomal RNA entrance pore.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			P
36	Y	3	90	27	30	6	24	3	0	0

- Molecule 37 is a RNA chain called 23S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			P
37	a	2880	92918	27587	31077	11398	19976	2880	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
a	887	A	U	variant	GB 937521852

- Molecule 38 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
38	b	76	1181	360	599	117	104	1	0	0

- Molecule 39 is a protein called 50S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
39	c	77	1277	388	652	129	106	2	0	0

- Molecule 40 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			P
40	d	120	3870	1144	1301	468	837	120	0	0

- Molecule 41 is a protein called 50S ribosomal protein L29.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
41	e	62	1032	308	531	98	94	1	0	0

- Molecule 42 is a protein called 50S ribosomal protein L30.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
42	f	58	936	281	488	87	78	2	0	0

- Molecule 43 is a protein called 50S ribosomal protein L31.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
43	g	66	1042	323	520	99	94	6	0	0

- Molecule 44 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
44	h	271	4236	1288	2154	423	364	7	0	0

- Molecule 45 is a protein called 50S ribosomal protein L32.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
45	i	56	903	269	459	94	80	1	0	0

- Molecule 46 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
46	j	209	3182	979	1617	288	294	4	0	0

- Molecule 47 is a protein called 50S ribosomal protein L33.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
47	k	52	890	275	464	78	73		0	0

- Molecule 48 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
48	l	201	3171	974	1619	283	290	5	0	0

- Molecule 49 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
49	m	46	795	228	418	90	57	2	0	0

- Molecule 50 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
50	n	177	2853	899	1443	249	256	6	0	0

- Molecule 51 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
51	o	64	1076	323	572	105	74	2	0	0

- Molecule 52 is a protein called 50S ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
52	p	175	2671	826	1358	241	244	2	0	0

- Molecule 53 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
53	q	38	645	185	343	65	48	4	0	0

- Molecule 54 is a protein called 50S ribosomal protein L9.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
54	r	149	2259	699	1148	197	214	1	0	0

- Molecule 55 is a protein called 50S ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
55	s	142	2291	714	1162	212	199	4	0	0

- Molecule 56 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
56	t	123	1969	593	1023	181	166	6	0	0

- Molecule 57 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
57	u	144	2182	654	1129	207	190	2	0	0

- Molecule 58 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
58	v	136	2231	686	1157	205	177	6	0	0

- Molecule 59 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
59	w	119	1945	588	994	195	163	5	0	0

- Molecule 60 is a protein called 50S ribosomal protein L18.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	H	N	O		
60	x	116	1815	552	923	178	162	0	0

- Molecule 61 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
61	y	114	1879	574	962	179	163	1	0	0

- Molecule 62 is a protein called 50S ribosomal protein L20.

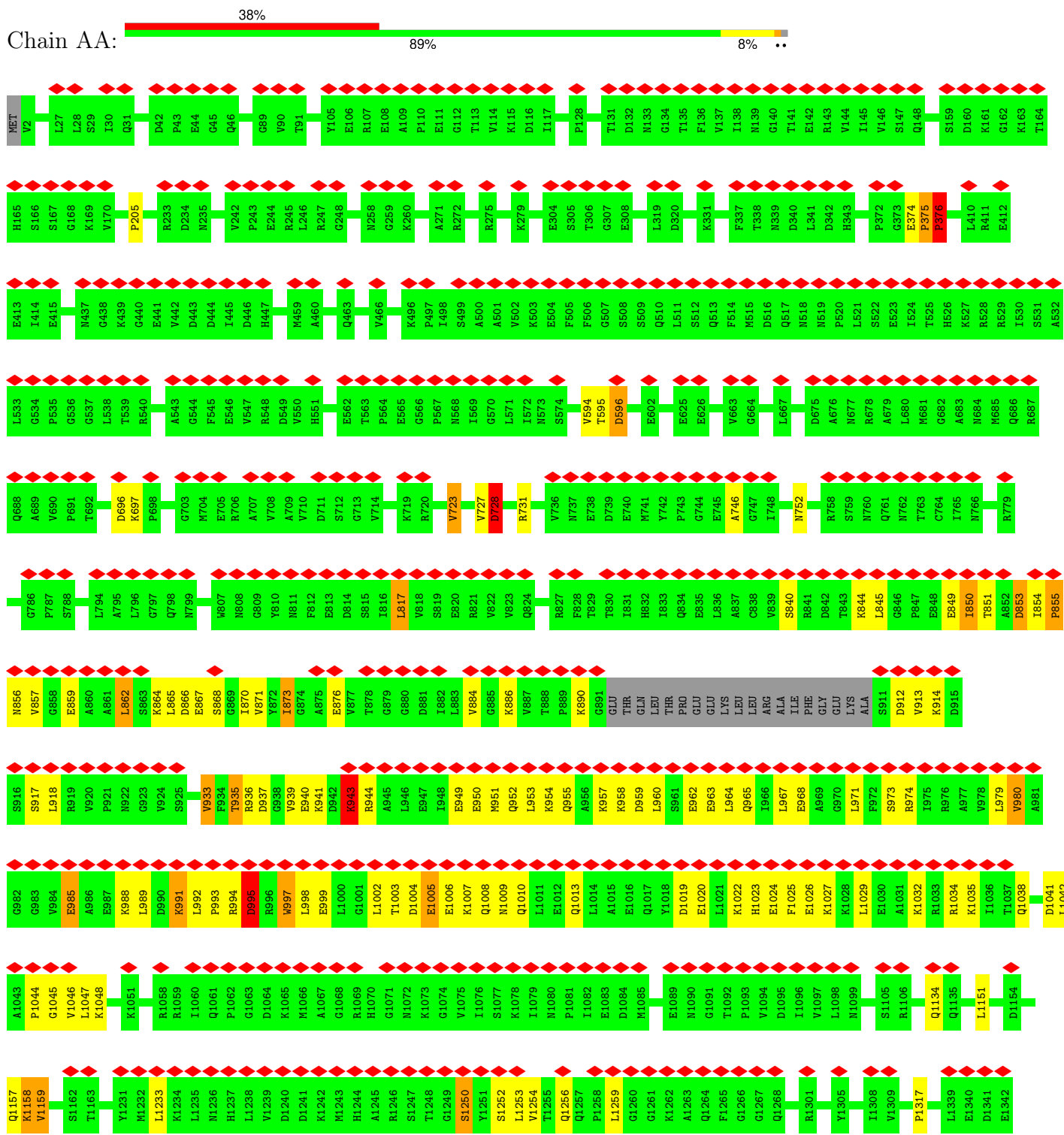
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	H	N	O		
62	z	117	1967	604	1020	192	151	0	0

- Molecule 63 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

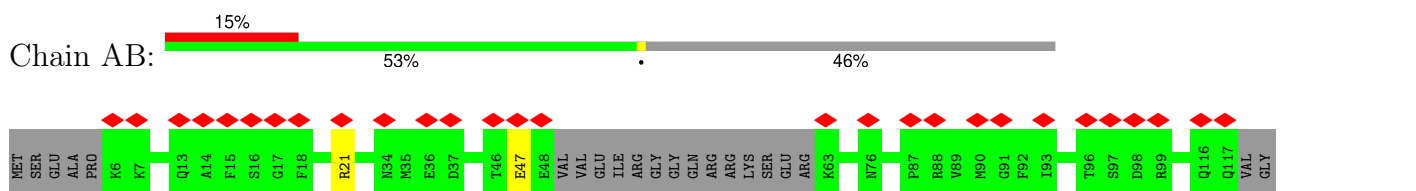
Mol	Chain	Residues	Atoms		AltConf
			Total	Mg	
63	7	1	1	1	0

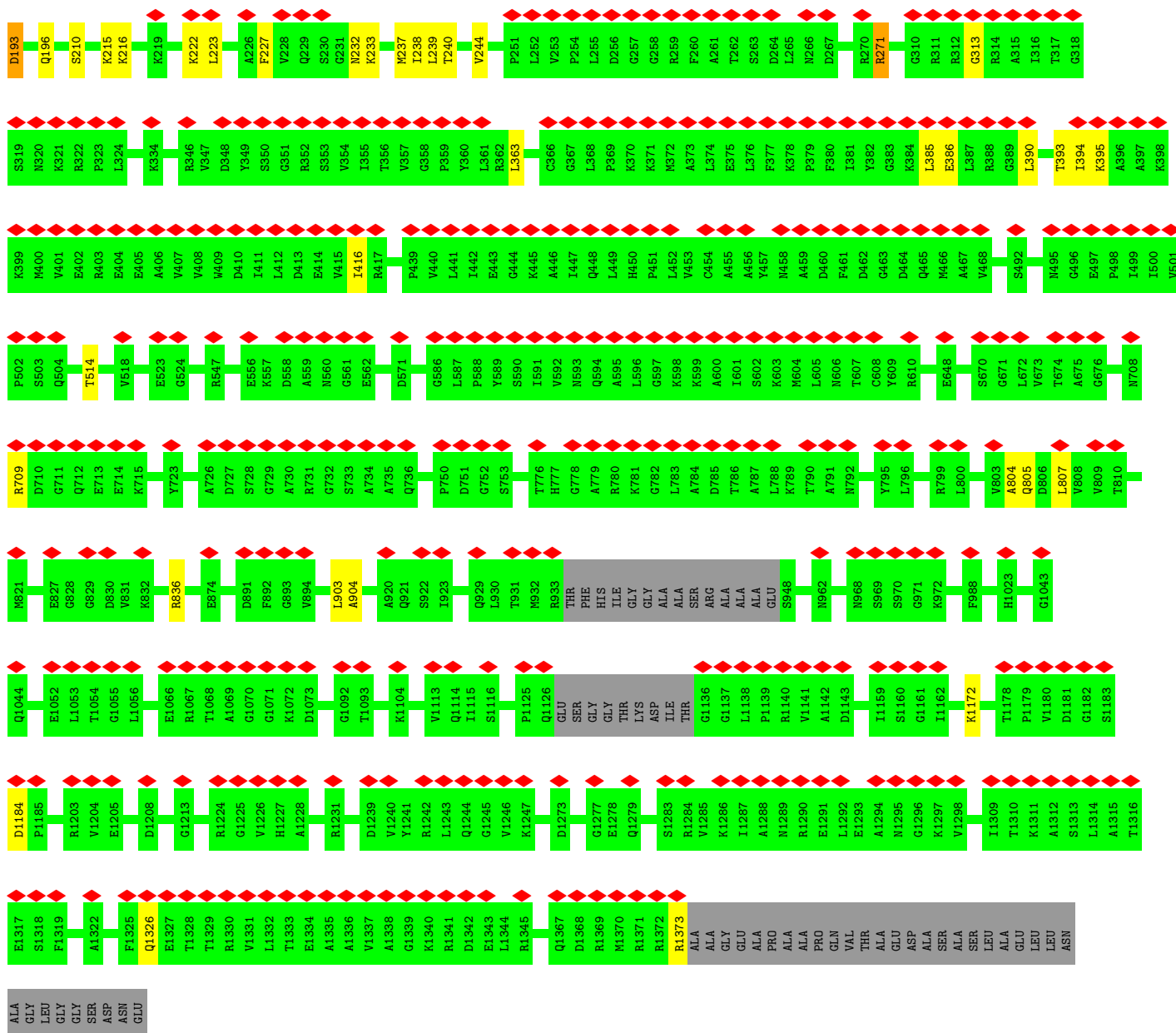
- Molecule 64 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
64	AA	2	2	2	0

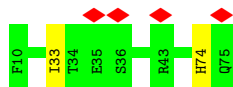


• Molecule 11: Transcription termination/antitermination protein NusG

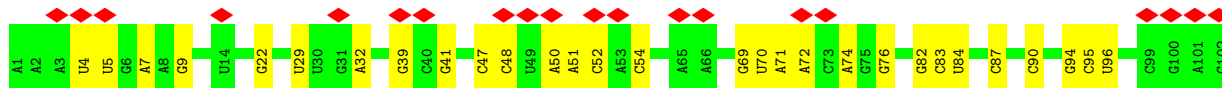
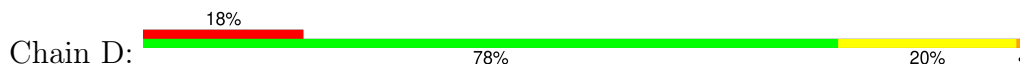


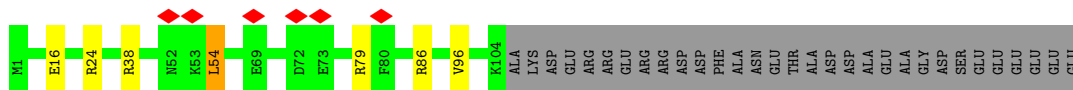


- Molecule 14: 30S ribosomal protein S18

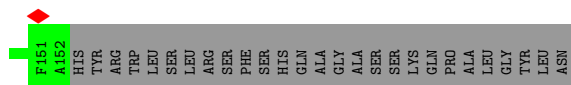
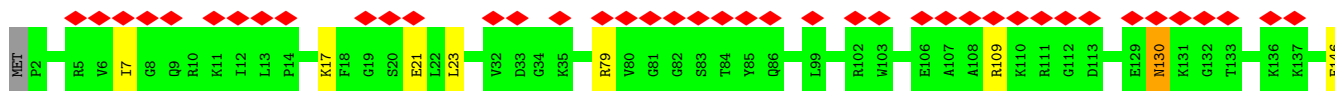
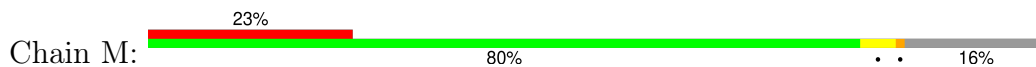


- Molecule 15: 16S rRNA

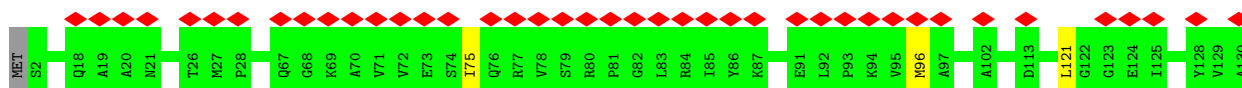




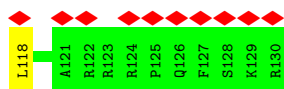
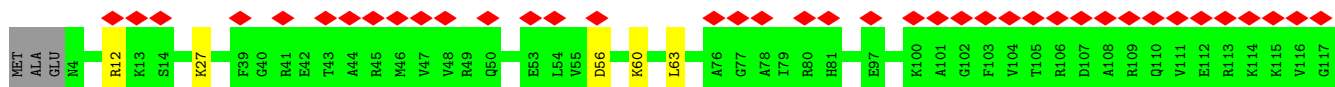
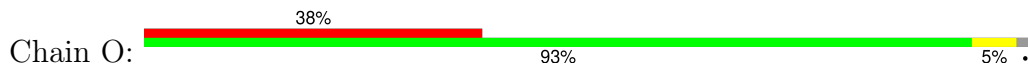
- Molecule 24: 30S ribosomal protein S7



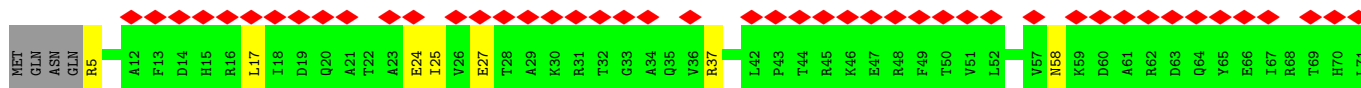
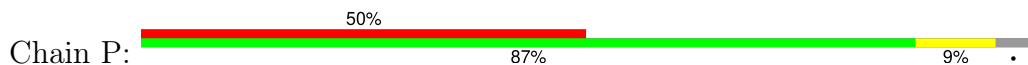
- Molecule 25: 30S ribosomal protein S8



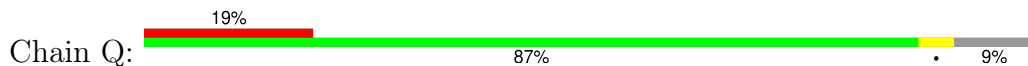
- Molecule 26: 30S ribosomal protein S9

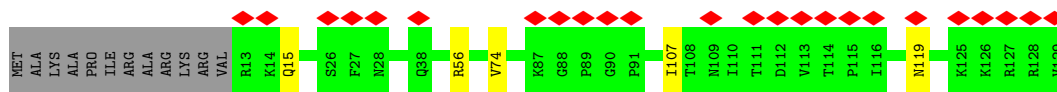


- Molecule 27: 30S ribosomal protein S10

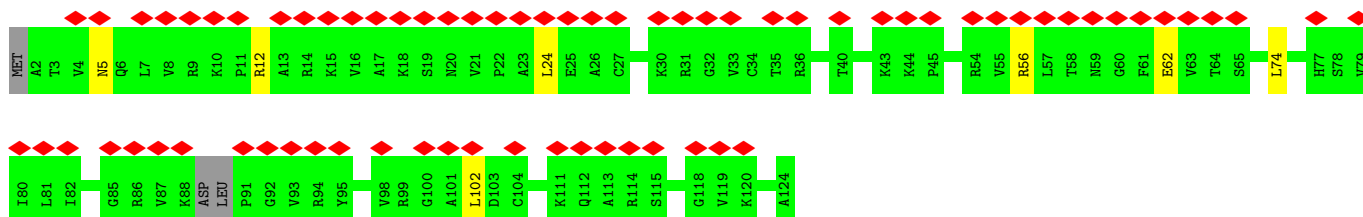
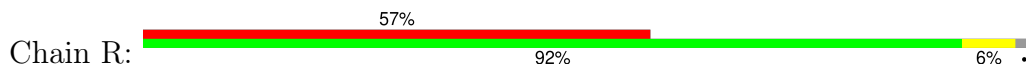


- Molecule 28: 30S ribosomal protein S11

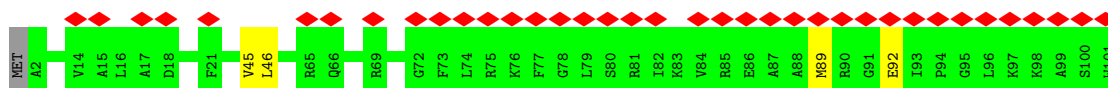
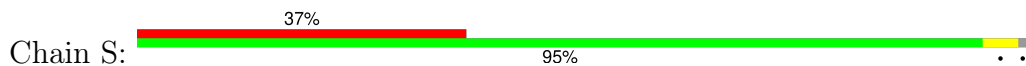




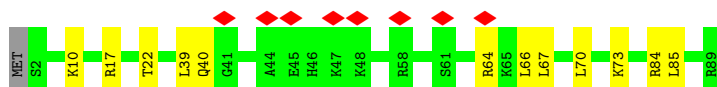
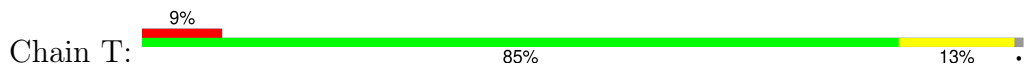
- Molecule 29: 30S ribosomal protein S12



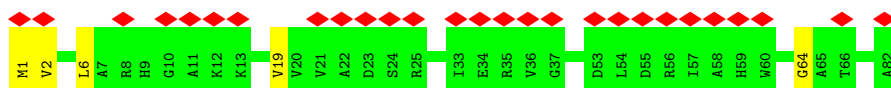
- Molecule 30: 30S ribosomal protein S14



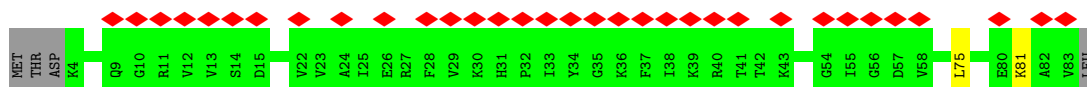
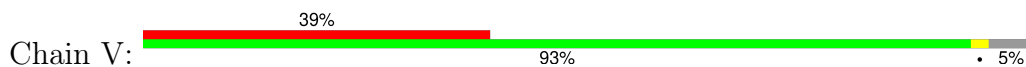
- Molecule 31: 30S ribosomal protein S15



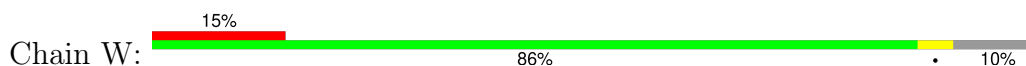
- Molecule 32: 30S ribosomal protein S16

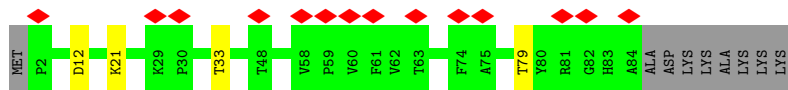


- Molecule 33: 30S ribosomal protein S17

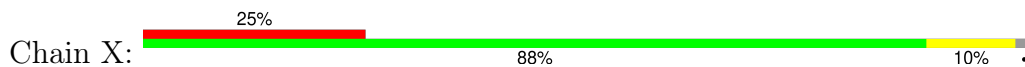


- Molecule 34: 30S ribosomal protein S19





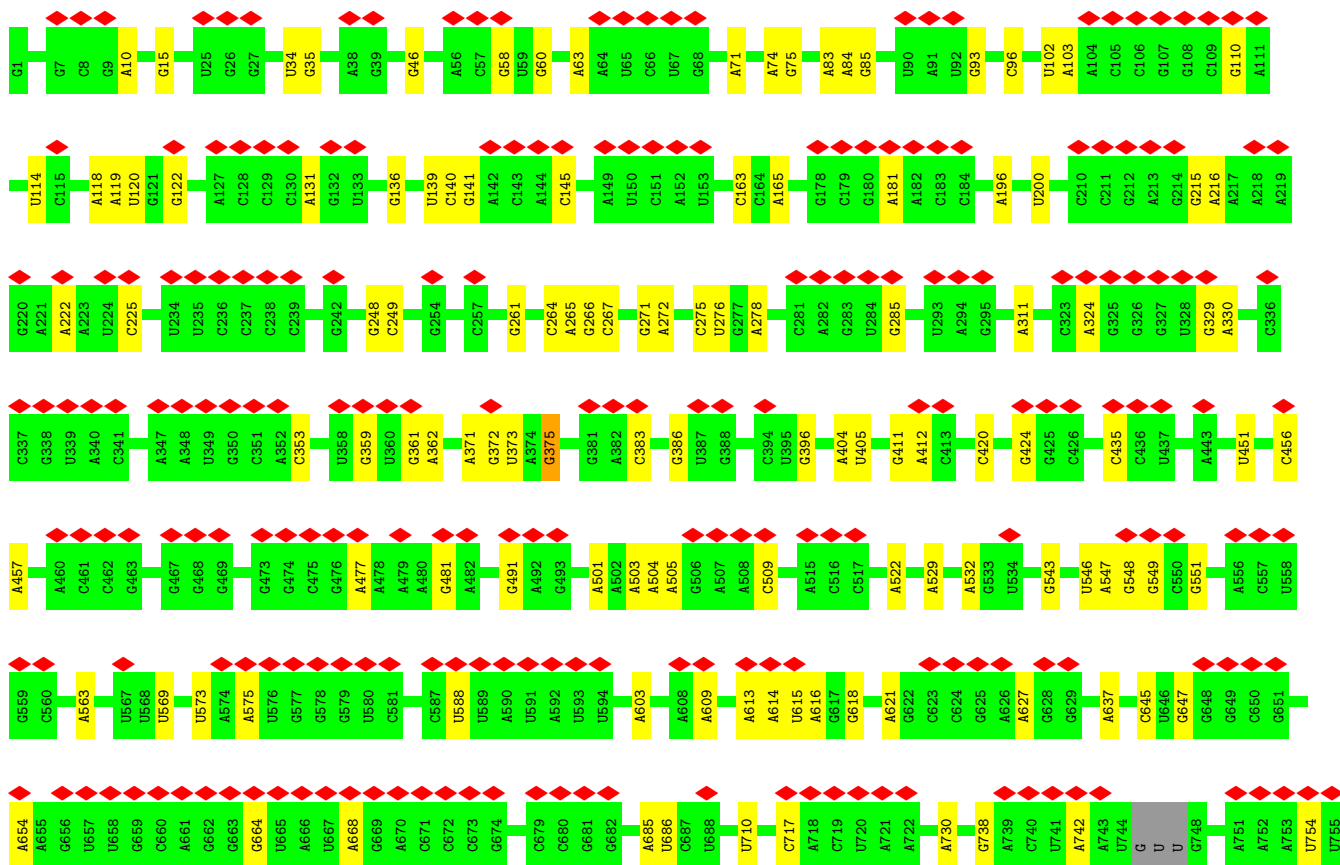
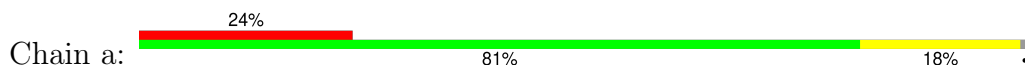
• Molecule 35: 30S ribosomal protein S13

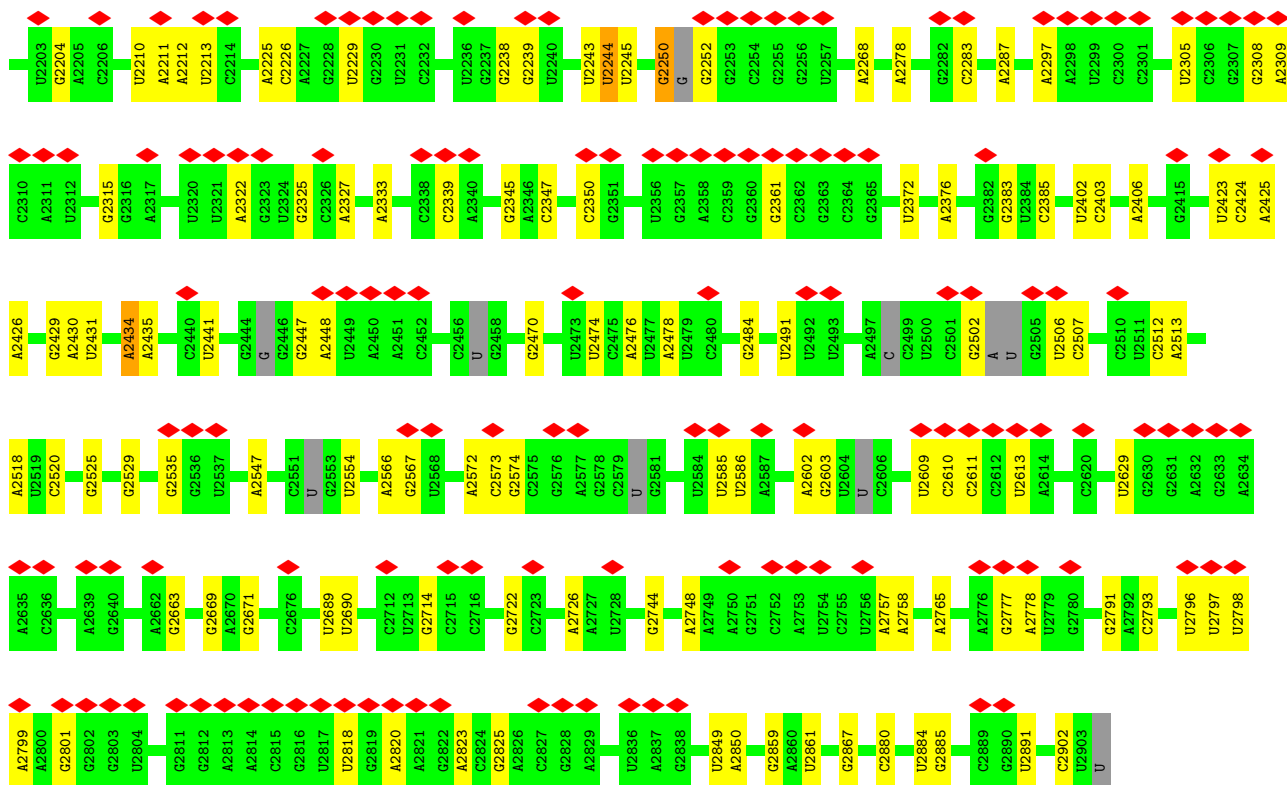


• Molecule 36: mRNA in the ribosomal RNA entrance pore

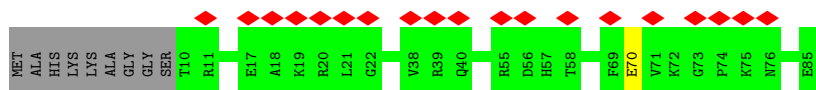
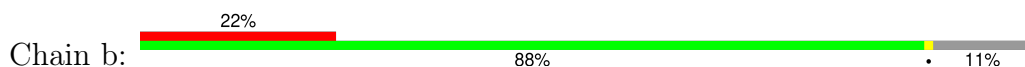


• Molecule 37: 23S rRNA

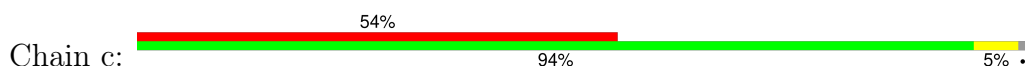




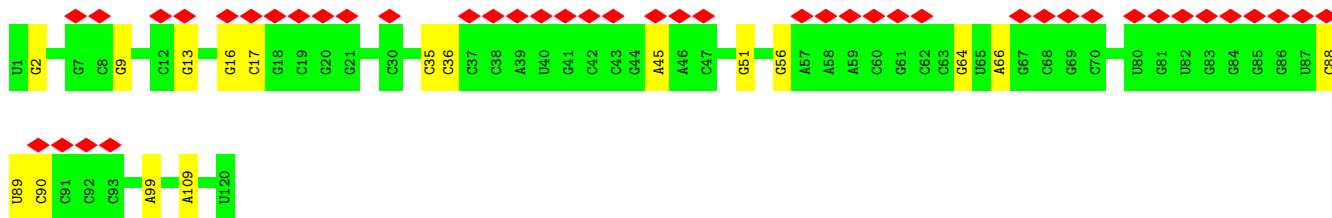
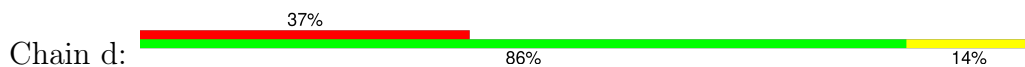
- Molecule 38: 50S ribosomal protein L27



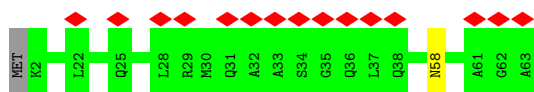
- Molecule 39: 50S ribosomal protein L28



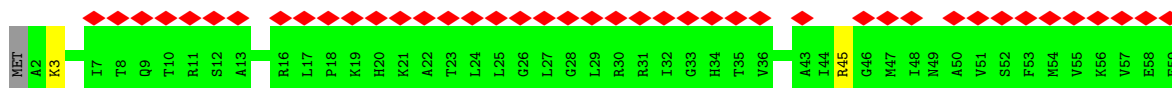
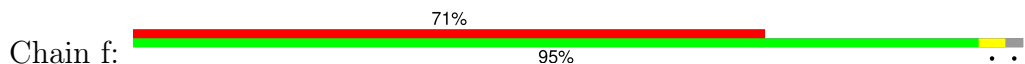
- Molecule 40: 5S rRNA



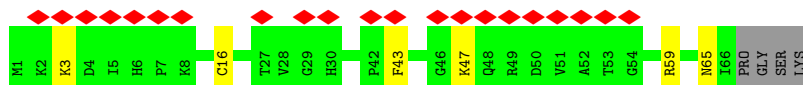
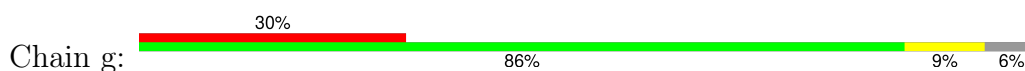
- Molecule 41: 50S ribosomal protein L29



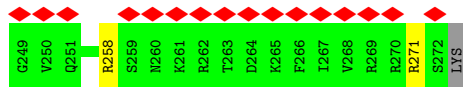
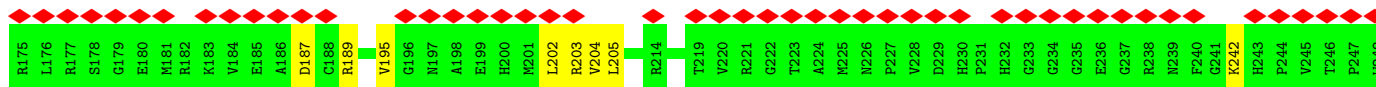
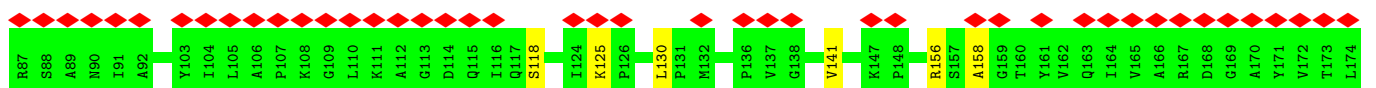
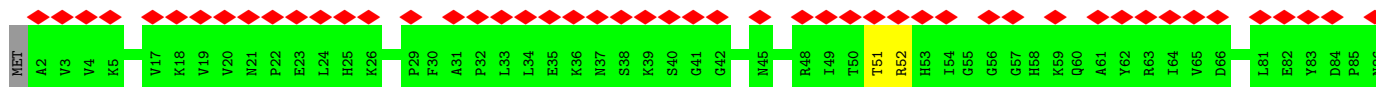
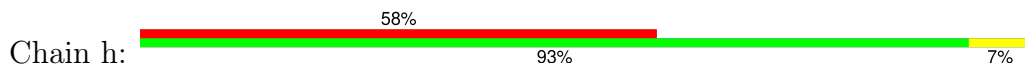
- Molecule 42: 50S ribosomal protein L30



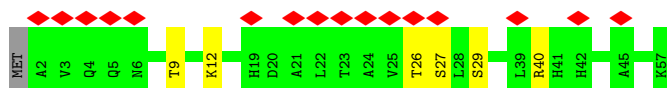
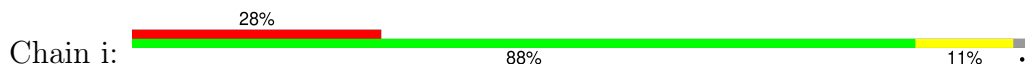
- Molecule 43: 50S ribosomal protein L31



- Molecule 44: 50S ribosomal protein L2

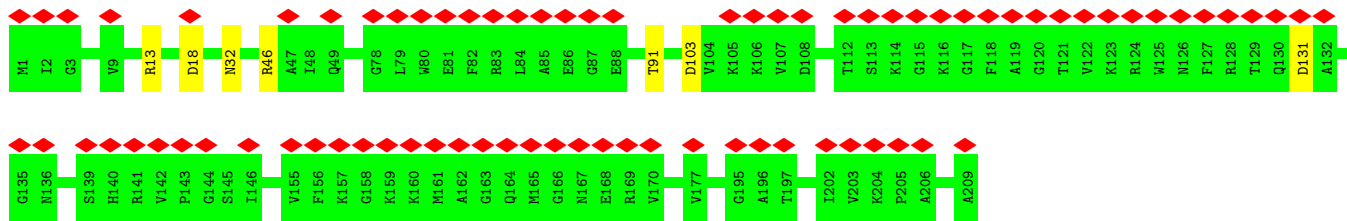


- Molecule 45: 50S ribosomal protein L32

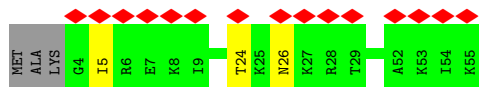
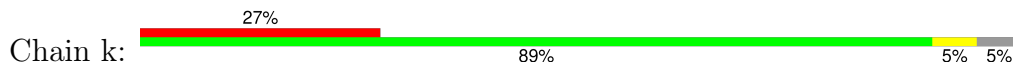


- Molecule 46: 50S ribosomal protein L3

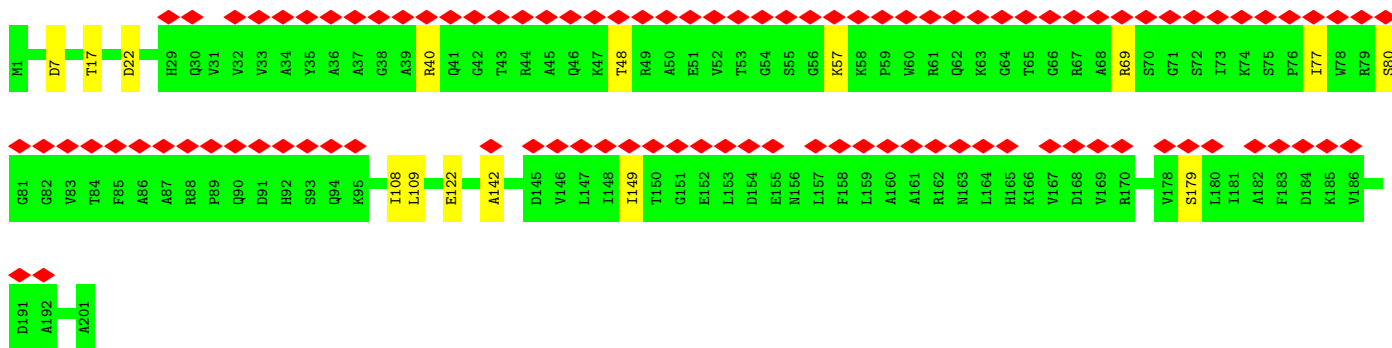
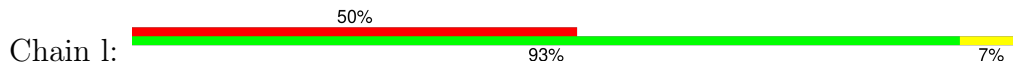




• Molecule 47: 50S ribosomal protein L33



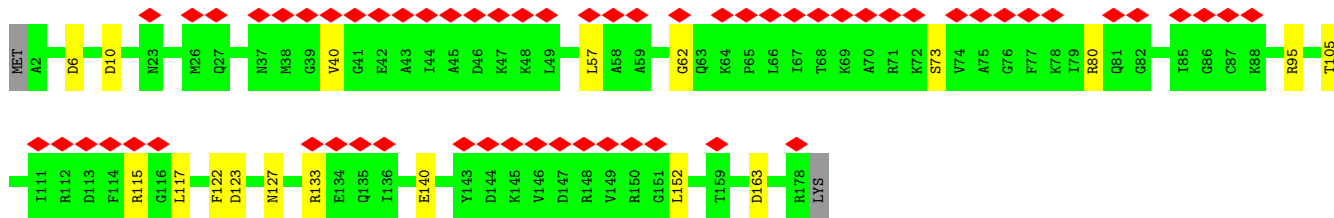
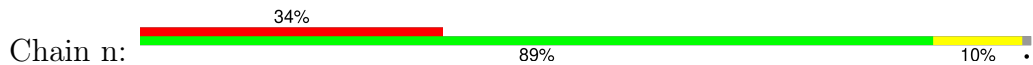
• Molecule 48: 50S ribosomal protein L4



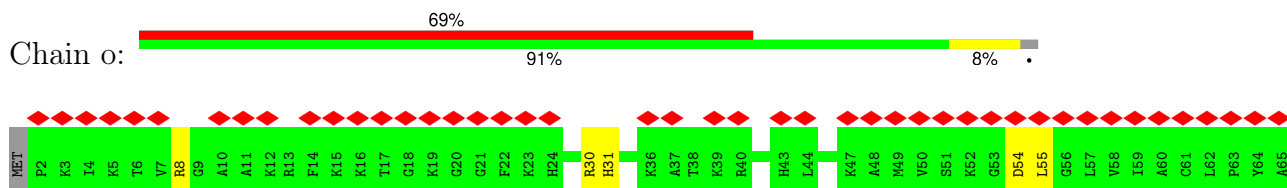
• Molecule 49: 50S ribosomal protein L34



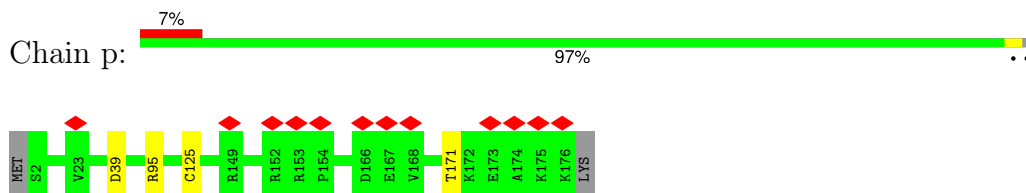
• Molecule 50: 50S ribosomal protein L5



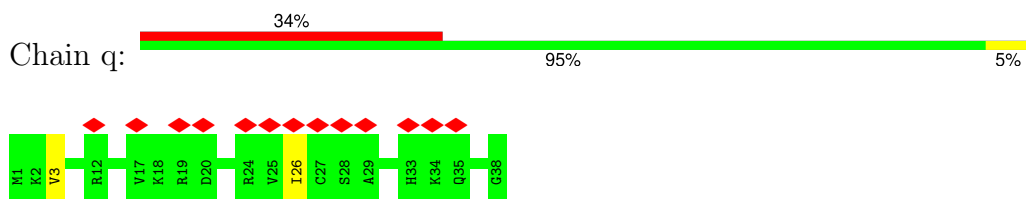
• Molecule 51: 50S ribosomal protein L35



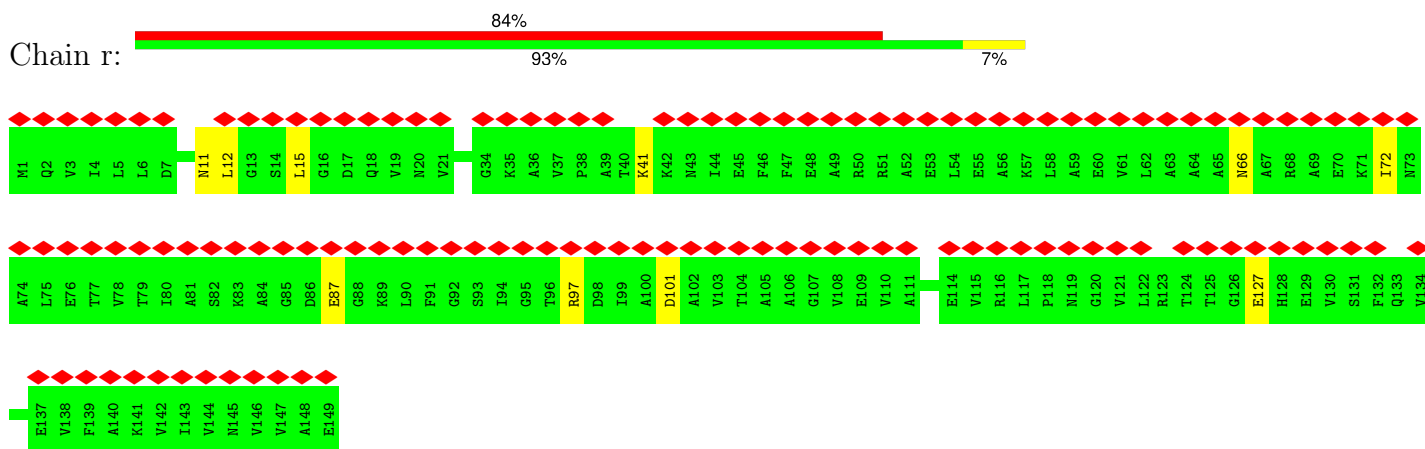
- Molecule 52: 50S ribosomal protein L6



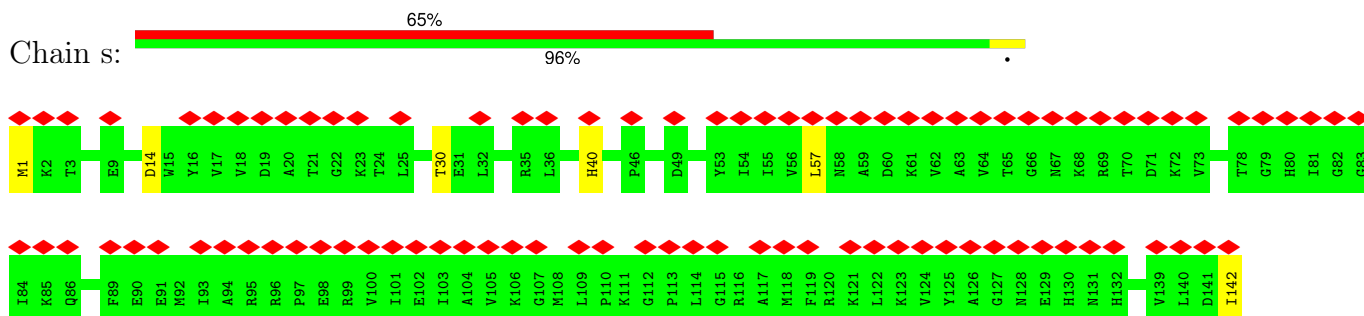
- Molecule 53: 50S ribosomal protein L36



- Molecule 54: 50S ribosomal protein L9

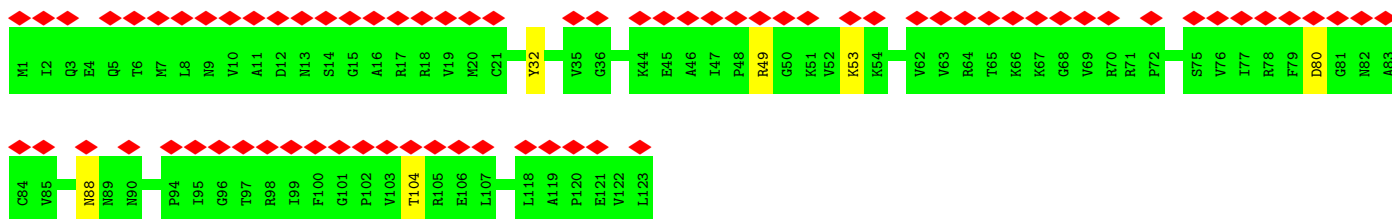


- Molecule 55: 50S ribosomal protein L13

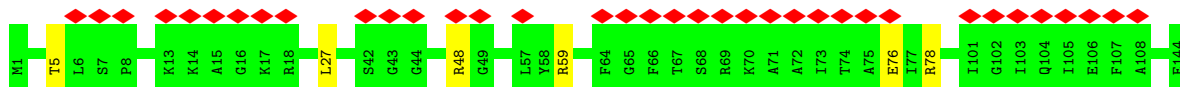


- Molecule 56: 50S ribosomal protein L14

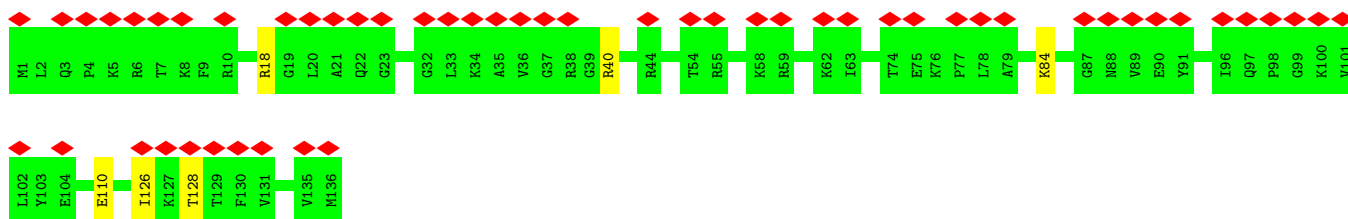
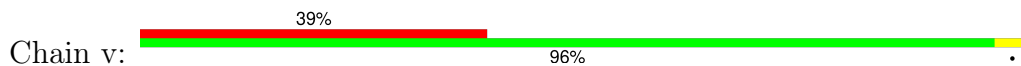




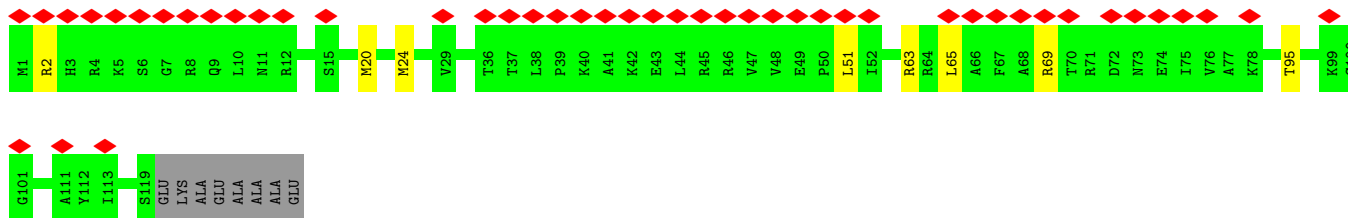
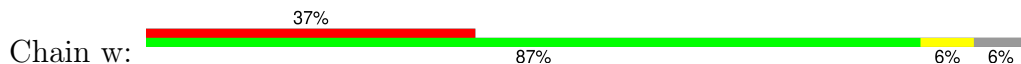
• Molecule 57: 50S ribosomal protein L15



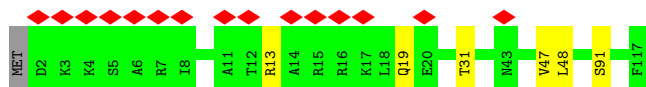
• Molecule 58: 50S ribosomal protein L16



• Molecule 59: 50S ribosomal protein L17

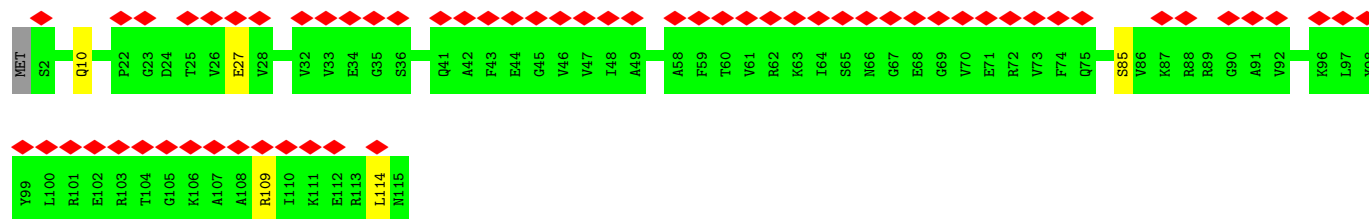


• Molecule 60: 50S ribosomal protein L18

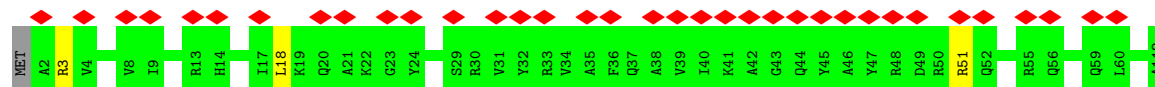


• Molecule 61: 50S ribosomal protein L19





- Molecule 62: 50S ribosomal protein L20



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	6188	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	45	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.136	Depositor
Minimum map value	-0.087	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.007	Depositor
Recommended contour level	0.0168	Depositor
Map size (Å)	562.56, 562.56, 562.56	wwPDB
Map dimensions	192, 192, 192	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	2.93, 2.93, 2.93	Depositor

5 Model quality

5.1 Standard geometry

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

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
1	0	0.38	0/829	0.67	0/1107
2	1	0.49	0/864	0.83	0/1156
3	2	0.42	0/752	0.71	0/1005
4	3	0.35	0/796	0.66	2/1062 (0.2%)
5	4	0.40	0/766	0.68	0/1025
6	5	1.13	6/528 (1.1%)	0.97	1/810 (0.1%)
7	6	1.11	4/603 (0.7%)	0.97	0/926
8	7	0.95	4/388 (1.0%)	1.04	0/604
9	A	0.38	0/1810	0.75	1/2821 (0.0%)
9	B	0.46	1/1810 (0.1%)	0.86	7/2821 (0.2%)
10	AA	0.59	2/10591 (0.0%)	0.75	15/14289 (0.1%)
11	AB	0.43	0/808	0.60	0/1088
12	AC	0.48	0/1808	0.62	1/2450 (0.0%)
12	AD	0.40	0/1789	0.57	0/2425
13	AE	0.52	3/10545 (0.0%)	0.66	5/14236 (0.0%)
14	C	0.48	0/553	0.83	0/743
15	D	0.34	10/36610 (0.0%)	0.74	30/57091 (0.1%)
16	E	0.57	0/675	0.85	0/895
17	F	0.56	0/597	0.87	0/792
18	G	0.49	0/1791	0.71	0/2413
19	H	0.54	1/1746 (0.1%)	1.03	11/2382 (0.5%)
20	I	0.43	0/1663	0.71	0/2241
21	J	0.47	0/1665	0.73	0/2227
22	K	0.45	0/1165	0.75	0/1568
23	L	0.43	0/867	0.75	1/1171 (0.1%)
24	M	0.50	0/1195	0.81	0/1602
25	N	0.41	0/989	0.69	0/1326
26	O	0.43	0/1034	0.75	0/1375
27	P	0.43	0/800	0.75	0/1082
28	Q	0.40	0/893	0.70	0/1205
29	R	0.35	0/952	0.74	0/1274
30	S	0.49	0/817	0.78	0/1088

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
31	T	0.53	0/722	0.86	0/964
32	U	0.44	0/659	0.78	0/884
33	V	0.34	0/657	0.62	0/881
34	W	0.38	0/680	0.62	0/915
35	X	0.49	0/909	0.87	0/1215
36	Y	0.26	0/65	0.74	0/98
37	a	0.38	3/69247 (0.0%)	0.72	18/107985 (0.0%)
38	b	0.39	0/589	0.71	0/779
39	c	0.48	0/635	0.81	1/848 (0.1%)
40	d	0.29	0/2872	0.69	0/4478
41	e	0.54	0/502	0.83	0/667
42	f	0.45	0/452	0.78	0/605
43	g	0.43	0/531	0.68	0/709
44	h	0.39	0/2121	0.78	0/2852
45	i	0.40	0/450	0.79	0/599
46	j	0.44	0/1586	0.70	0/2134
47	k	0.35	0/433	0.65	0/576
48	l	0.46	0/1571	0.77	0/2113
49	m	0.53	0/380	0.99	0/498
50	n	0.49	0/1434	0.88	3/1926 (0.2%)
51	o	0.45	0/513	0.83	0/676
52	p	0.39	0/1333	0.67	0/1805
53	q	0.37	0/303	0.77	0/397
54	r	0.43	0/1122	0.69	0/1515
55	s	0.50	0/1152	0.75	0/1551
56	t	0.41	0/955	0.78	0/1279
57	u	0.40	0/1062	0.76	0/1413
58	v	0.47	0/1093	0.81	0/1460
59	w	0.52	0/964	0.87	0/1289
60	x	0.46	0/902	0.81	0/1209
61	y	0.41	0/929	0.73	1/1242 (0.1%)
62	z	0.60	0/960	0.91	0/1278
All	All	0.43	34/186482 (0.0%)	0.74	97/275140 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
9	A	0	2
9	B	0	2

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Mol	Chain	#Chirality outliers	#Planarity outliers
10	AA	0	10
13	AE	0	5
19	H	0	3
35	X	0	1
All	All	0	23

All (34) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
15	D	1516	G	O3'-P	-13.44	1.45	1.61
15	D	1339	A	O3'-P	10.58	1.73	1.61
10	AA	374	GLU	C-N	10.48	1.54	1.34
13	AE	88	CYS	CB-SG	-10.12	1.65	1.82
6	5	109	DT	O3'-P	8.65	1.71	1.61
15	D	145	G	O3'-P	8.46	1.71	1.61
15	D	196	A	O3'-P	8.28	1.71	1.61
7	6	10	DG	C1'-N9	-8.25	1.35	1.47
10	AA	850	ILE	N-CA	-8.21	1.29	1.46
15	D	1275	A	O3'-P	7.79	1.70	1.61
37	a	2434	A	O3'-P	7.53	1.70	1.61
19	H	169	SER	N-CA	7.49	1.61	1.46
15	D	1515	G	O3'-P	-7.28	1.52	1.61
6	5	121	DG	C1'-N9	-7.28	1.37	1.47
15	D	1395	C	O3'-P	7.24	1.69	1.61
15	D	1490	U	O3'-P	6.82	1.69	1.61
8	7	69	G	C1'-N9	-6.80	1.37	1.46
6	5	112	DG	C1'-N9	-6.65	1.38	1.47
15	D	1492	A	O3'-P	6.61	1.69	1.61
37	a	1905	C	O3'-P	6.56	1.69	1.61
37	a	2167	U	O3'-P	6.53	1.69	1.61
6	5	100	DA	C1'-N9	-6.51	1.38	1.47
7	6	21	DA	C1'-N9	-6.40	1.38	1.47
13	AE	93	THR	CA-C	6.19	1.69	1.52
6	5	116	DG	C1'-N9	-6.06	1.38	1.47
8	7	59	U	C1'-N1	6.06	1.57	1.48
6	5	115	DA	C1'-N9	-5.97	1.38	1.47
13	AE	70	CYS	CA-CB	-5.81	1.41	1.53
8	7	60	U	C1'-N1	5.75	1.57	1.48
15	D	1397	C	O3'-P	5.73	1.68	1.61
9	B	36	U	O3'-P	5.72	1.68	1.61
7	6	28	DA	C1'-N9	-5.70	1.39	1.47
8	7	64	U	C1'-N1	5.35	1.56	1.48

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	6	24	DT	C1'-N1	5.27	1.56	1.49

All (97) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
15	D	1516	G	P-O3'-C3'	-18.99	96.91	119.70
15	D	1516	G	O3'-P-O5'	13.79	130.20	104.00
10	AA	1250	SER	C-N-CA	11.17	149.63	121.70
37	a	2252	G	N9-C1'-C2'	-10.93	99.80	114.00
15	D	1401	G	N9-C1'-C2'	-10.68	100.12	114.00
50	n	73	SER	N-CA-CB	-10.61	94.59	110.50
15	D	1499	A	N9-C1'-C2'	-10.28	100.64	114.00
15	D	528	C	N1-C1'-C2'	-10.21	100.73	114.00
19	H	169	SER	N-CA-C	9.98	137.94	111.00
15	D	1339	A	P-O3'-C3'	9.86	131.53	119.70
9	B	29	G	N9-C1'-C2'	-9.76	101.27	112.00
9	B	28	C	P-O3'-C3'	9.61	131.23	119.70
13	AE	271	ARG	NE-CZ-NH2	-9.37	115.61	120.30
15	D	196	A	P-O3'-C3'	9.32	130.88	119.70
10	AA	375	PRO	CA-N-CD	-9.24	98.56	111.50
15	D	526	C	N1-C1'-C2'	-8.82	102.30	112.00
19	H	88	LYS	C-N-CA	8.76	143.60	121.70
37	a	2167	U	P-O3'-C3'	8.58	129.99	119.70
15	D	1208	C	N1-C1'-C2'	-8.55	102.60	112.00
15	D	1206	G	N9-C1'-C2'	-8.40	102.76	112.00
37	a	2434	A	P-O3'-C3'	8.24	129.59	119.70
10	AA	995	ASP	O-C-N	-8.22	109.55	122.70
10	AA	376	PRO	N-CA-CB	-8.07	93.62	103.30
15	D	1406	U	N1-C1'-C2'	-7.82	103.40	112.00
37	a	1905	C	P-O3'-C3'	7.66	128.89	119.70
15	D	1275	A	P-O3'-C3'	7.64	128.87	119.70
15	D	1490	U	P-O3'-C3'	7.57	128.78	119.70
15	D	1492	A	P-O3'-C3'	7.54	128.75	119.70
19	H	305	HIS	N-CA-C	7.43	131.07	111.00
9	B	29	G	C3'-C2'-O2'	7.36	134.64	113.30
15	D	1206	G	C4'-C3'-O3'	7.17	127.34	113.00
9	B	35	A	P-O3'-C3'	7.13	128.25	119.70
15	D	1493	A	C2'-C3'-O3'	7.10	125.11	109.50
37	a	2245	U	N1-C1'-C2'	-7.04	104.25	112.00
15	D	145	G	P-O3'-C3'	7.02	128.13	119.70
15	D	1516	G	OP1-P-O3'	-6.98	89.85	105.20
15	D	1395	C	P-O3'-C3'	6.97	128.07	119.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
10	AA	855	PRO	N-CA-CB	-6.82	95.10	102.60
50	n	73	SER	CB-CA-C	6.71	122.86	110.10
10	AA	995	ASP	CA-C-N	6.69	131.93	117.20
15	D	1515	G	O3'-P-O5'	-6.66	91.35	104.00
15	D	1401	G	C4'-C3'-O3'	6.63	126.27	113.00
37	a	2250	G	C4'-C3'-O3'	-6.60	95.54	109.40
37	a	1379	U	C2'-C3'-O3'	6.57	124.21	113.70
37	a	2243	U	N1-C1'-C2'	-6.56	104.79	112.00
19	H	339	ARG	C-N-CA	6.49	137.92	121.70
10	AA	935	THR	CA-CB-OG1	-6.48	95.39	109.00
15	D	1515	G	P-O3'-C3'	6.48	127.47	119.70
15	D	515	G	N9-C1'-C2'	-6.43	104.93	112.00
15	D	1408	A	N9-C1'-C2'	-6.41	104.95	112.00
15	D	1497	G	N9-C1'-C2'	-6.40	104.96	112.00
9	B	34	C	P-O3'-C3'	6.40	127.38	119.70
6	5	109	DT	P-O3'-C3'	6.38	127.36	119.70
12	AC	117	HIS	CB-CA-C	-6.20	98.00	110.40
10	AA	849	GLU	C-N-CA	6.15	137.07	121.70
19	H	140	PRO	N-CA-CB	5.97	110.46	103.30
10	AA	1004	ASP	CB-CA-C	5.97	122.33	110.40
10	AA	943	LYS	CA-C-O	-5.96	107.57	120.10
9	B	29	G	P-O3'-C3'	5.93	126.81	119.70
19	H	330	VAL	N-CA-C	5.91	126.95	111.00
19	H	336	ASP	CB-CA-C	-5.88	98.64	110.40
10	AA	727	VAL	N-CA-C	-5.87	95.17	111.00
10	AA	943	LYS	CA-C-N	5.86	130.10	117.20
37	a	754	U	N1-C1'-C2'	5.86	121.61	114.00
13	AE	903	LEU	C-N-CA	5.79	136.18	121.70
19	H	168	VAL	C-N-CA	5.79	136.16	121.70
19	H	132	PRO	N-CA-CB	5.78	110.23	103.30
15	D	517	G	C5'-C4'-C3'	5.74	125.18	116.00
19	H	344	LEU	CA-CB-CG	5.66	128.32	115.30
50	n	127	ASN	CB-CA-C	5.66	121.71	110.40
37	a	2244	U	C1'-C2'-O2'	-5.64	93.67	110.60
13	AE	363	LEU	CA-CB-CG	5.56	128.10	115.30
23	L	54	LEU	CA-CB-CG	5.56	128.09	115.30
10	AA	1233	LEU	CA-CB-CG	5.46	127.86	115.30
37	a	783	A	C4'-C3'-O3'	5.46	123.92	113.00
15	D	1397	C	P-O3'-C3'	5.36	126.13	119.70
4	3	22	ARG	NE-CZ-NH1	5.34	122.97	120.30
61	y	109	ARG	NE-CZ-NH2	5.34	122.97	120.30
15	D	1340	A	C5'-C4'-C3'	5.31	124.50	116.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
39	c	28	ARG	NE-CZ-NH2	-5.25	117.68	120.30
10	AA	728	ASP	N-CA-C	5.24	125.16	111.00
15	D	1340	A	C5'-C4'-O4'	5.24	115.38	109.10
37	a	404	A	C2'-C3'-O3'	5.24	122.08	113.70
37	a	742	A	C8-N9-C1'	-5.23	118.29	127.70
10	AA	817	LEU	CB-CG-CD2	-5.20	102.16	111.00
19	H	169	SER	N-CA-CB	-5.20	102.70	110.50
4	3	22	ARG	NE-CZ-NH2	-5.18	117.71	120.30
37	a	2244	U	C4'-C3'-O3'	5.16	123.32	113.00
37	a	2252	G	C4'-C3'-O3'	5.10	123.19	113.00
9	B	48	C	N1-C1'-C2'	5.09	120.61	114.00
37	a	742	A	C4-N9-C1'	5.07	135.43	126.30
15	D	197	A	C2'-C3'-O3'	5.07	121.81	113.70
13	AE	807	LEU	CB-CG-CD2	-5.05	102.42	111.00
13	AE	73	GLY	N-CA-C	5.04	125.71	113.10
9	A	48	C	N1-C1'-C2'	5.04	120.55	114.00
37	a	1141	U	N1-C1'-C2'	5.00	120.50	114.00
37	a	375	G	C2'-C3'-O3'	5.00	121.70	113.70

There are no chirality outliers.

All (23) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
9	A	19	G	Sidechain
9	A	7	G	Sidechain
10	AA	1134	GLN	Peptide
10	AA	1157	GLN	Peptide
10	AA	1158	LYS	Peptide
10	AA	205	PRO	Peptide
10	AA	594	VAL	Peptide
10	AA	595	THR	Peptide
10	AA	596	ASP	Mainchain
10	AA	696	ASP	Peptide
10	AA	746	ALA	Peptide
10	AA	853	ASP	Mainchain
13	AE	1184	ASP	Peptide
13	AE	1326	GLN	Peptide
13	AE	313	GLY	Peptide
13	AE	416	ILE	Peptide
13	AE	804	ALA	Peptide
9	B	19	G	Sidechain
9	B	7	G	Sidechain

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Mol	Chain	Res	Type	Group
19	H	274	TYR	Peptide
19	H	81	GLU	Peptide
19	H	82	THR	Peptide
35	X	100	GLN	Mainchain

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	
1	0	101/103 (98%)	97 (96%)	3 (3%)	1 (1%)	13	49
2	1	108/110 (98%)	104 (96%)	4 (4%)	0	100	100
3	2	92/100 (92%)	90 (98%)	2 (2%)	0	100	100
4	3	101/104 (97%)	96 (95%)	4 (4%)	1 (1%)	13	49
5	4	92/94 (98%)	90 (98%)	2 (2%)	0	100	100
10	AA	1318/1342 (98%)	1150 (87%)	136 (10%)	32 (2%)	5	27
11	AB	94/181 (52%)	88 (94%)	6 (6%)	0	100	100
12	AC	228/329 (69%)	215 (94%)	11 (5%)	2 (1%)	14	52
12	AD	226/329 (69%)	213 (94%)	12 (5%)	1 (0%)	30	68
13	AE	1329/1407 (94%)	1199 (90%)	121 (9%)	9 (1%)	19	57
14	C	64/66 (97%)	63 (98%)	1 (2%)	0	100	100
16	E	84/87 (97%)	83 (99%)	1 (1%)	0	100	100
17	F	68/71 (96%)	68 (100%)	0	0	100	100
18	G	223/241 (92%)	210 (94%)	13 (6%)	0	100	100
19	H	255/557 (46%)	188 (74%)	55 (22%)	12 (5%)	2	16

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
20	I	206/233 (88%)	196 (95%)	9 (4%)	1 (0%)	25	64
21	J	203/206 (98%)	198 (98%)	5 (2%)	0	100	100
22	K	154/167 (92%)	146 (95%)	7 (4%)	1 (1%)	22	60
23	L	102/135 (76%)	97 (95%)	4 (4%)	1 (1%)	13	49
24	M	149/179 (83%)	144 (97%)	4 (3%)	1 (1%)	19	57
25	N	127/130 (98%)	121 (95%)	5 (4%)	1 (1%)	16	55
26	O	125/130 (96%)	115 (92%)	9 (7%)	1 (1%)	16	55
27	P	97/103 (94%)	88 (91%)	8 (8%)	1 (1%)	13	49
28	Q	115/129 (89%)	104 (90%)	9 (8%)	2 (2%)	7	37
29	R	117/124 (94%)	116 (99%)	1 (1%)	0	100	100
30	S	98/101 (97%)	96 (98%)	2 (2%)	0	100	100
31	T	86/89 (97%)	82 (95%)	4 (5%)	0	100	100
32	U	80/82 (98%)	75 (94%)	4 (5%)	1 (1%)	10	43
33	V	78/84 (93%)	74 (95%)	4 (5%)	0	100	100
34	W	81/92 (88%)	78 (96%)	3 (4%)	0	100	100
35	X	114/118 (97%)	107 (94%)	5 (4%)	2 (2%)	7	35
38	b	74/85 (87%)	69 (93%)	5 (7%)	0	100	100
39	c	75/78 (96%)	72 (96%)	3 (4%)	0	100	100
41	e	60/63 (95%)	57 (95%)	3 (5%)	0	100	100
42	f	56/59 (95%)	53 (95%)	3 (5%)	0	100	100
43	g	64/70 (91%)	63 (98%)	1 (2%)	0	100	100
44	h	269/273 (98%)	259 (96%)	9 (3%)	1 (0%)	30	68
45	i	54/57 (95%)	51 (94%)	3 (6%)	0	100	100
46	j	207/209 (99%)	198 (96%)	9 (4%)	0	100	100
47	k	50/55 (91%)	50 (100%)	0	0	100	100
48	l	199/201 (99%)	190 (96%)	8 (4%)	1 (0%)	25	64
49	m	44/46 (96%)	43 (98%)	1 (2%)	0	100	100
50	n	175/179 (98%)	162 (93%)	11 (6%)	2 (1%)	12	47
51	o	62/65 (95%)	59 (95%)	3 (5%)	0	100	100
52	p	173/177 (98%)	161 (93%)	12 (7%)	0	100	100
53	q	36/38 (95%)	35 (97%)	1 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
54	r	147/149 (99%)	136 (92%)	11 (8%)	0	100	100
55	s	140/142 (99%)	135 (96%)	5 (4%)	0	100	100
56	t	121/123 (98%)	111 (92%)	10 (8%)	0	100	100
57	u	142/144 (99%)	135 (95%)	7 (5%)	0	100	100
58	v	134/136 (98%)	129 (96%)	5 (4%)	0	100	100
59	w	117/127 (92%)	107 (92%)	10 (8%)	0	100	100
60	x	114/117 (97%)	108 (95%)	6 (5%)	0	100	100
61	y	112/115 (97%)	105 (94%)	7 (6%)	0	100	100
62	z	115/118 (98%)	110 (96%)	4 (4%)	1 (1%)	14	52
All	All	9055/10049 (90%)	8389 (93%)	591 (6%)	75 (1%)	19	55

All (75) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
10	AA	596	ASP
10	AA	853	ASP
10	AA	859	GLU
10	AA	862	LEU
10	AA	873	ILE
10	AA	937	ASP
10	AA	993	PRO
19	H	139	ARG
19	H	153	GLU
19	H	169	SER
19	H	306	VAL
19	H	340	ARG
26	O	56	ASP
35	X	103	LYS
10	AA	375	PRO
10	AA	856	ASN
10	AA	870	ILE
10	AA	940	GLU
10	AA	985	GLU
10	AA	1003	THR
10	AA	1158	LYS
13	AE	175	GLU
19	H	108	VAL
19	H	309	MET
19	H	333	LEU

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Mol	Chain	Res	Type
44	h	158	ALA
48	l	142	ALA
62	z	3	ARG
10	AA	376	PRO
10	AA	723	VAL
10	AA	728	ASP
10	AA	935	THR
10	AA	980	VAL
10	AA	1005	GLU
10	AA	1045	GLY
12	AC	164	ASP
13	AE	51	PRO
13	AE	805	GLN
19	H	76	GLU
19	H	142	ARG
24	M	130	ASN
27	P	58	ASN
28	Q	119	ASN
10	AA	850	ILE
10	AA	943	LYS
10	AA	995	ASP
12	AC	165	GLU
13	AE	174	ASP
13	AE	193	ASP
19	H	82	THR
20	I	80	LYS
35	X	105	ASN
50	n	40	VAL
10	AA	917	SER
10	AA	991	LYS
10	AA	997	TRP
10	AA	1044	PRO
13	AE	91	GLU
19	H	70	VAL
4	3	39	ILE
12	AD	210	THR
13	AE	49	PHE
13	AE	73	GLY
13	AE	904	ALA
23	L	96	VAL
1	0	44	GLY
10	AA	697	LYS

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Mol	Chain	Res	Type
10	AA	1159	VAL
10	AA	1317	PRO
22	K	44	GLY
28	Q	74	VAL
32	U	64	GLY
50	n	62	GLY
10	AA	933	VAL
25	N	75	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	
1	0	84/84 (100%)	78 (93%)	6 (7%)	12	32
2	1	93/93 (100%)	84 (90%)	9 (10%)	6	22
3	2	81/84 (96%)	76 (94%)	5 (6%)	15	36
4	3	84/85 (99%)	78 (93%)	6 (7%)	12	32
5	4	78/78 (100%)	74 (95%)	4 (5%)	20	41
10	AA	1140/1157 (98%)	1039 (91%)	101 (9%)	8	25
11	AB	86/158 (54%)	84 (98%)	2 (2%)	45	64
12	AC	198/286 (69%)	182 (92%)	16 (8%)	9	28
12	AD	196/286 (68%)	194 (99%)	2 (1%)	73	82
13	AE	1120/1168 (96%)	1051 (94%)	69 (6%)	15	36
14	C	57/57 (100%)	55 (96%)	2 (4%)	31	51
16	E	65/66 (98%)	60 (92%)	5 (8%)	10	30
17	F	60/61 (98%)	57 (95%)	3 (5%)	20	41
18	G	187/199 (94%)	178 (95%)	9 (5%)	21	43
19	H	137/461 (30%)	128 (93%)	9 (7%)	14	34
20	I	171/190 (90%)	165 (96%)	6 (4%)	31	51
21	J	172/173 (99%)	165 (96%)	7 (4%)	26	47

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
22	K	119/126 (94%)	112 (94%)	7 (6%)	16	37
23	L	91/116 (78%)	85 (93%)	6 (7%)	14	34
24	M	124/147 (84%)	116 (94%)	8 (6%)	14	35
25	N	104/105 (99%)	102 (98%)	2 (2%)	52	69
26	O	105/107 (98%)	100 (95%)	5 (5%)	21	43
27	P	86/90 (96%)	78 (91%)	8 (9%)	7	23
28	Q	90/99 (91%)	87 (97%)	3 (3%)	33	52
29	R	101/104 (97%)	94 (93%)	7 (7%)	13	33
30	S	83/84 (99%)	79 (95%)	4 (5%)	21	43
31	T	76/77 (99%)	64 (84%)	12 (16%)	2	10
32	U	65/65 (100%)	61 (94%)	4 (6%)	15	36
33	V	74/78 (95%)	72 (97%)	2 (3%)	40	58
34	W	72/79 (91%)	68 (94%)	4 (6%)	17	38
35	X	94/96 (98%)	85 (90%)	9 (10%)	7	22
38	b	58/63 (92%)	57 (98%)	1 (2%)	56	72
39	c	67/68 (98%)	64 (96%)	3 (4%)	23	45
41	e	54/55 (98%)	53 (98%)	1 (2%)	52	69
42	f	48/49 (98%)	46 (96%)	2 (4%)	25	46
43	g	59/62 (95%)	53 (90%)	6 (10%)	6	20
44	h	216/218 (99%)	199 (92%)	17 (8%)	10	29
45	i	47/48 (98%)	41 (87%)	6 (13%)	3	14
46	j	164/164 (100%)	157 (96%)	7 (4%)	25	46
47	k	47/49 (96%)	44 (94%)	3 (6%)	14	35
48	l	165/165 (100%)	151 (92%)	14 (8%)	8	27
49	m	38/38 (100%)	35 (92%)	3 (8%)	10	29
50	n	148/150 (99%)	134 (90%)	14 (10%)	7	22
51	o	51/52 (98%)	46 (90%)	5 (10%)	6	21
52	p	136/138 (99%)	132 (97%)	4 (3%)	37	56
53	q	34/34 (100%)	32 (94%)	2 (6%)	16	37
54	r	114/114 (100%)	104 (91%)	10 (9%)	8	25
55	s	116/116 (100%)	110 (95%)	6 (5%)	19	40

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
56	t	104/104 (100%)	98 (94%)	6 (6%)	17	38
57	u	103/103 (100%)	97 (94%)	6 (6%)	17	38
58	v	109/109 (100%)	103 (94%)	6 (6%)	18	39
59	w	99/103 (96%)	91 (92%)	8 (8%)	9	28
60	x	86/87 (99%)	80 (93%)	6 (7%)	12	32
61	y	99/100 (99%)	95 (96%)	4 (4%)	27	47
62	z	89/90 (99%)	87 (98%)	2 (2%)	47	65
All	All	7544/8338 (90%)	7060 (94%)	484 (6%)	17	35

All (484) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	0	10	LYS
1	0	13	ARG
1	0	48	LYS
1	0	51	VAL
1	0	68	ARG
1	0	86	GLN
2	1	7	HIS
2	1	19	LEU
2	1	30	SER
2	1	41	LYS
2	1	69	LEU
2	1	97	LEU
2	1	107	VAL
2	1	109	ASP
2	1	110	ARG
3	2	1	MET
3	2	24	MET
3	2	37	ASP
3	2	59	ASN
3	2	93	LEU
4	3	52	LEU
4	3	68	SER
4	3	72	ILE
4	3	89	ASP
4	3	99	ASN
4	3	101	GLU
5	4	40	ILE
5	4	41	GLU

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Mol	Chain	Res	Type
5	4	69	GLU
5	4	71	LYS
10	AA	376	PRO
10	AA	723	VAL
10	AA	728	ASP
10	AA	731	ARG
10	AA	752	ASN
10	AA	817	LEU
10	AA	840	SER
10	AA	844	LYS
10	AA	845	LEU
10	AA	851	THR
10	AA	854	ILE
10	AA	855	PRO
10	AA	857	VAL
10	AA	862	LEU
10	AA	864	LYS
10	AA	865	LEU
10	AA	866	ASP
10	AA	867	GLU
10	AA	868	SER
10	AA	871	VAL
10	AA	873	ILE
10	AA	876	GLU
10	AA	884	VAL
10	AA	886	LYS
10	AA	890	LYS
10	AA	912	ASP
10	AA	913	VAL
10	AA	914	LYS
10	AA	918	LEU
10	AA	933	VAL
10	AA	936	ARG
10	AA	939	VAL
10	AA	941	LYS
10	AA	943	LYS
10	AA	944	ARG
10	AA	949	GLU
10	AA	950	GLU
10	AA	951	MET
10	AA	952	GLN
10	AA	953	LEU

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Mol	Chain	Res	Type
10	AA	954	LYS
10	AA	955	GLN
10	AA	957	LYS
10	AA	958	LYS
10	AA	959	ASP
10	AA	960	LEU
10	AA	962	GLU
10	AA	963	GLU
10	AA	964	LEU
10	AA	965	GLN
10	AA	967	LEU
10	AA	968	GLU
10	AA	971	LEU
10	AA	973	SER
10	AA	974	ARG
10	AA	979	LEU
10	AA	980	VAL
10	AA	985	GLU
10	AA	988	LYS
10	AA	989	LEU
10	AA	991	LYS
10	AA	992	LEU
10	AA	994	ARG
10	AA	995	ASP
10	AA	997	TRP
10	AA	998	LEU
10	AA	999	GLU
10	AA	1002	LEU
10	AA	1005	GLU
10	AA	1006	GLU
10	AA	1007	LYS
10	AA	1008	GLN
10	AA	1009	ASN
10	AA	1010	GLN
10	AA	1013	GLN
10	AA	1019	ASP
10	AA	1020	GLU
10	AA	1022	LYS
10	AA	1023	HIS
10	AA	1024	GLU
10	AA	1025	PHE
10	AA	1026	GLU

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Mol	Chain	Res	Type
10	AA	1027	LYS
10	AA	1029	LEU
10	AA	1032	LYS
10	AA	1034	ARG
10	AA	1035	LYS
10	AA	1038	GLN
10	AA	1041	ASP
10	AA	1042	LEU
10	AA	1046	VAL
10	AA	1047	LEU
10	AA	1048	LYS
10	AA	1151	LEU
10	AA	1159	VAL
10	AA	1250	SER
10	AA	1252	SER
10	AA	1253	LEU
10	AA	1254	VAL
10	AA	1256	GLN
10	AA	1259	LEU
11	AB	21	ARG
11	AB	47	GLU
12	AC	12	ARG
12	AC	62	ASP
12	AC	65	LEU
12	AC	72	GLU
12	AC	91	ARG
12	AC	134	THR
12	AC	158	ARG
12	AC	159	ILE
12	AC	160	HIS
12	AC	162	GLU
12	AC	163	GLU
12	AC	165	GLU
12	AC	166	ARG
12	AC	168	ILE
12	AC	170	ARG
12	AC	171	LEU
12	AD	12	ARG
12	AD	208	ASN
13	AE	40	LYS
13	AE	42	GLU
13	AE	44	ILE

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Mol	Chain	Res	Type
13	AE	46	TYR
13	AE	47	ARG
13	AE	49	PHE
13	AE	50	LYS
13	AE	52	GLU
13	AE	53	ARG
13	AE	54	ASP
13	AE	60	ARG
13	AE	67	ASP
13	AE	70	CYS
13	AE	72	CYS
13	AE	74	LYS
13	AE	76	LYS
13	AE	77	ARG
13	AE	78	LEU
13	AE	81	ARG
13	AE	87	LYS
13	AE	88	CYS
13	AE	91	GLU
13	AE	94	GLN
13	AE	95	THR
13	AE	99	ARG
13	AE	100	GLU
13	AE	117	LEU
13	AE	119	SER
13	AE	123	ARG
13	AE	132	LEU
13	AE	135	ILE
13	AE	142	GLU
13	AE	144	TYR
13	AE	145	VAL
13	AE	147	ILE
13	AE	152	THR
13	AE	154	LEU
13	AE	157	GLN
13	AE	159	ILE
13	AE	175	GLU
13	AE	180	MET
13	AE	190	LYS
13	AE	193	ASP
13	AE	196	GLN
13	AE	210	SER

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Mol	Chain	Res	Type
13	AE	215	LYS
13	AE	216	LYS
13	AE	222	LYS
13	AE	223	LEU
13	AE	227	PHE
13	AE	232	ASN
13	AE	233	LYS
13	AE	237	MET
13	AE	238	ILE
13	AE	239	LEU
13	AE	240	THR
13	AE	244	VAL
13	AE	271	ARG
13	AE	385	LEU
13	AE	386	GLU
13	AE	390	LEU
13	AE	393	THR
13	AE	394	ILE
13	AE	395	LYS
13	AE	514	THR
13	AE	709	ARG
13	AE	836	ARG
13	AE	1172	LYS
13	AE	1373	ARG
14	C	33	ILE
14	C	74	HIS
16	E	6	SER
16	E	10	ARG
16	E	48	GLN
16	E	54	MET
16	E	64	LYS
17	F	34	ARG
17	F	62	ARG
17	F	67	ARG
18	G	8	ASP
18	G	23	TRP
18	G	45	LYS
18	G	105	LYS
18	G	108	ARG
18	G	128	LYS
18	G	129	LEU
18	G	132	LYS

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Mol	Chain	Res	Type
18	G	208	ARG
19	H	9	PHE
19	H	54	LYS
19	H	273	ARG
19	H	305	HIS
19	H	336	ASP
19	H	337	GLU
19	H	338	GLU
19	H	339	ARG
19	H	340	ARG
20	I	14	ILE
20	I	75	ILE
20	I	89	LYS
20	I	164	ARG
20	I	185	ASN
20	I	200	VAL
21	J	47	ARG
21	J	48	LEU
21	J	95	GLU
21	J	104	ARG
21	J	116	GLN
21	J	138	SER
21	J	143	VAL
22	K	10	GLU
22	K	15	LEU
22	K	60	ILE
22	K	114	VAL
22	K	115	LEU
22	K	138	ARG
22	K	162	GLU
23	L	16	GLU
23	L	24	ARG
23	L	38	ARG
23	L	54	LEU
23	L	79	ARG
23	L	86	ARG
24	M	7	ILE
24	M	17	LYS
24	M	21	GLU
24	M	23	LEU
24	M	79	ARG
24	M	109	ARG

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Mol	Chain	Res	Type
24	M	130	ASN
24	M	146	GLU
25	N	96	MET
25	N	121	LEU
26	O	12	ARG
26	O	27	LYS
26	O	60	LYS
26	O	63	LEU
26	O	118	LEU
27	P	5	ARG
27	P	17	LEU
27	P	24	GLU
27	P	25	ILE
27	P	27	GLU
27	P	37	ARG
27	P	87	LEU
27	P	90	LEU
28	Q	15	GLN
28	Q	56	ARG
28	Q	107	ILE
29	R	5	ASN
29	R	12	ARG
29	R	24	LEU
29	R	56	ARG
29	R	62	GLU
29	R	74	LEU
29	R	102	LEU
30	S	45	VAL
30	S	46	LEU
30	S	89	MET
30	S	92	GLU
31	T	10	LYS
31	T	17	ARG
31	T	22	THR
31	T	39	LEU
31	T	40	GLN
31	T	64	ARG
31	T	66	LEU
31	T	67	LEU
31	T	70	LEU
31	T	73	LYS
31	T	84	ARG

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Mol	Chain	Res	Type
31	T	85	LEU
32	U	1	MET
32	U	2	VAL
32	U	6	LEU
32	U	19	VAL
33	V	75	LEU
33	V	81	LYS
34	W	12	ASP
34	W	21	LYS
34	W	33	THR
34	W	79	THR
35	X	11	ASP
35	X	16	VAL
35	X	25	VAL
35	X	29	ARG
35	X	59	GLU
35	X	92	ARG
35	X	93	ARG
35	X	101	ARG
35	X	117	LYS
38	b	70	GLU
39	c	48	THR
39	c	54	LYS
39	c	71	LEU
41	e	58	ASN
42	f	3	LYS
42	f	45	ARG
43	g	3	LYS
43	g	16	CYS
43	g	43	PHE
43	g	47	LYS
43	g	59	ARG
43	g	65	ASN
44	h	51	THR
44	h	52	ARG
44	h	118	SER
44	h	125	LYS
44	h	130	LEU
44	h	141	VAL
44	h	156	ARG
44	h	187	ASP
44	h	189	ARG

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Mol	Chain	Res	Type
44	h	195	VAL
44	h	202	LEU
44	h	203	ARG
44	h	204	VAL
44	h	205	LEU
44	h	242	LYS
44	h	258	ARG
44	h	271	ARG
45	i	9	THR
45	i	12	LYS
45	i	26	THR
45	i	27	SER
45	i	29	SER
45	i	40	ARG
46	j	13	ARG
46	j	18	ASP
46	j	32	ASN
46	j	46	ARG
46	j	91	THR
46	j	103	ASP
46	j	131	ASP
47	k	5	ILE
47	k	24	THR
47	k	26	ASN
48	l	7	ASP
48	l	17	THR
48	l	22	ASP
48	l	40	ARG
48	l	48	THR
48	l	57	LYS
48	l	69	ARG
48	l	77	ILE
48	l	80	SER
48	l	108	ILE
48	l	109	LEU
48	l	122	GLU
48	l	149	ILE
48	l	179	SER
49	m	22	MET
49	m	41	ARG
49	m	42	LEU
50	n	6	ASP

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Mol	Chain	Res	Type
50	n	10	ASP
50	n	57	LEU
50	n	80	ARG
50	n	95	ARG
50	n	105	THR
50	n	115	ARG
50	n	117	LEU
50	n	122	PHE
50	n	123	ASP
50	n	133	ARG
50	n	140	GLU
50	n	152	LEU
50	n	163	ASP
51	o	8	ARG
51	o	30	ARG
51	o	31	HIS
51	o	54	ASP
51	o	55	LEU
52	p	39	ASP
52	p	95	ARG
52	p	125	CYS
52	p	171	THR
53	q	3	VAL
53	q	26	ILE
54	r	11	ASN
54	r	12	LEU
54	r	15	LEU
54	r	41	LYS
54	r	66	ASN
54	r	72	ILE
54	r	87	GLU
54	r	97	ARG
54	r	101	ASP
54	r	127	GLU
55	s	1	MET
55	s	14	ASP
55	s	30	THR
55	s	40	HIS
55	s	57	LEU
55	s	142	ILE
56	t	32	TYR
56	t	49	ARG

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Mol	Chain	Res	Type
56	t	53	LYS
56	t	80	ASP
56	t	88	ASN
56	t	104	THR
57	u	5	THR
57	u	27	LEU
57	u	48	ARG
57	u	59	ARG
57	u	76	GLU
57	u	78	ARG
58	v	18	ARG
58	v	40	ARG
58	v	84	LYS
58	v	110	GLU
58	v	126	ILE
58	v	128	THR
59	w	2	ARG
59	w	20	MET
59	w	24	MET
59	w	51	LEU
59	w	63	ARG
59	w	65	LEU
59	w	69	ARG
59	w	95	THR
60	x	13	ARG
60	x	19	GLN
60	x	31	THR
60	x	47	VAL
60	x	48	LEU
60	x	91	SER
61	y	10	GLN
61	y	27	GLU
61	y	85	SER
61	y	114	LEU
62	z	18	LEU
62	z	51	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
18	G	18	HIS
22	K	70	ASN

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Mol	Chain	Res	Type
31	T	40	GLN
35	X	105	ASN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
15	D	1515/1542 (98%)	289 (19%)	35 (2%)
36	Y	2/3 (66%)	2 (100%)	0
37	a	2859/2904 (98%)	531 (18%)	0
40	d	119/120 (99%)	17 (14%)	0
8	7	15/32 (46%)	7 (46%)	0
9	A	75/76 (98%)	29 (38%)	6 (8%)
9	B	75/76 (98%)	35 (46%)	6 (8%)
All	All	4660/4753 (98%)	910 (19%)	47 (1%)

All (910) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
8	7	56	U
8	7	57	G
8	7	58	A
8	7	59	U
8	7	60	U
8	7	62	G
8	7	63	G
9	A	2	G
9	A	6	G
9	A	7	G
9	A	8	U
9	A	10	G
9	A	13	C
9	A	14	A
9	A	15	G
9	A	16	C
9	A	17	C
9	A	18	G
9	A	19	G
9	A	20	U
9	A	21	A
9	A	22	G
9	A	23	C

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Mol	Chain	Res	Type
9	A	46	G
9	A	47	U
9	A	48	C
9	A	49	G
9	A	52	G
9	A	57	A
9	A	58	A
9	A	59	A
9	A	61	C
9	A	66	C
9	A	69	C
9	A	71	C
9	A	73	A
9	B	2	G
9	B	6	G
9	B	7	G
9	B	8	U
9	B	10	G
9	B	13	C
9	B	14	A
9	B	15	G
9	B	16	C
9	B	17	C
9	B	18	G
9	B	19	G
9	B	20	U
9	B	21	A
9	B	22	G
9	B	23	C
9	B	30	G
9	B	31	G
9	B	32	C
9	B	36	U
9	B	37	A
9	B	38	A
9	B	46	G
9	B	47	U
9	B	48	C
9	B	49	G
9	B	52	G
9	B	57	A
9	B	58	A

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Mol	Chain	Res	Type
9	B	59	A
9	B	61	C
9	B	66	C
9	B	69	C
9	B	71	C
9	B	73	A
15	D	4	U
15	D	5	U
15	D	9	G
15	D	22	G
15	D	29	U
15	D	32	A
15	D	39	G
15	D	41	G
15	D	47	C
15	D	48	C
15	D	50	A
15	D	51	A
15	D	52	C
15	D	54	C
15	D	69	G
15	D	70	U
15	D	71	A
15	D	72	A
15	D	74	A
15	D	76	G
15	D	82	G
15	D	83	C
15	D	84	U
15	D	87	C
15	D	90	C
15	D	94	G
15	D	95	C
15	D	96	U
15	D	108	G
15	D	120	A
15	D	122	G
15	D	128	G
15	D	131	A
15	D	141	G
15	D	144	G
15	D	148	G

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Mol	Chain	Res	Type
15	D	149	A
15	D	160	A
15	D	164	G
15	D	173	U
15	D	181	A
15	D	182	A
15	D	197	A
15	D	198	G
15	D	204	G
15	D	208	U
15	D	209	U
15	D	210	C
15	D	211	G
15	D	212	G
15	D	216	U
15	D	226	G
15	D	245	U
15	D	247	G
15	D	251	G
15	D	253	A
15	D	258	G
15	D	262	A
15	D	266	G
15	D	267	C
15	D	271	C
15	D	279	A
15	D	289	G
15	D	299	G
15	D	306	A
15	D	321	A
15	D	328	C
15	D	329	A
15	D	332	G
15	D	347	G
15	D	352	C
15	D	353	A
15	D	354	G
15	D	355	C
15	D	367	U
15	D	372	C
15	D	373	A
15	D	376	G

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Mol	Chain	Res	Type
15	D	382	A
15	D	384	G
15	D	392	C
15	D	393	A
15	D	397	A
15	D	406	G
15	D	412	A
15	D	413	G
15	D	414	A
15	D	421	U
15	D	422	C
15	D	424	G
15	D	429	U
15	D	446	G
15	D	451	A
15	D	457	G
15	D	458	U
15	D	460	A
15	D	463	U
15	D	464	U
15	D	467	U
15	D	468	A
15	D	469	C
15	D	478	A
15	D	479	U
15	D	481	G
15	D	484	G
15	D	485	U
15	D	486	U
15	D	505	G
15	D	509	A
15	D	511	C
15	D	518	C
15	D	519	C
15	D	526	C
15	D	531	U
15	D	532	A
15	D	533	A
15	D	542	G
15	D	547	A
15	D	559	A
15	D	562	U

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Mol	Chain	Res	Type
15	D	568	G
15	D	572	A
15	D	573	A
15	D	576	C
15	D	577	G
15	D	579	A
15	D	596	A
15	D	628	G
15	D	633	G
15	D	642	A
15	D	649	A
15	D	650	G
15	D	653	U
15	D	665	A
15	D	666	G
15	D	687	A
15	D	700	G
15	D	723	U
15	D	724	G
15	D	731	G
15	D	734	G
15	D	747	A
15	D	748	G
15	D	755	G
15	D	760	G
15	D	777	A
15	D	793	U
15	D	794	A
15	D	815	A
15	D	817	C
15	D	828	U
15	D	829	G
15	D	832	G
15	D	841	C
15	D	844	G
15	D	845	A
15	D	849	G
15	D	874	G
15	D	887	G
15	D	902	G
15	D	914	A
15	D	916	U

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Mol	Chain	Res	Type
15	D	926	G
15	D	934	C
15	D	935	A
15	D	954	G
15	D	960	U
15	D	963	G
15	D	969	A
15	D	972	C
15	D	975	A
15	D	976	G
15	D	991	U
15	D	992	U
15	D	993	G
15	D	996	A
15	D	999	C
15	D	1004	A
15	D	1008	U
15	D	1009	U
15	D	1017	U
15	D	1018	G
15	D	1021	A
15	D	1024	G
15	D	1026	G
15	D	1028	C
15	D	1030	U
15	D	1031	C
15	D	1037	C
15	D	1043	G
15	D	1044	A
15	D	1046	A
15	D	1065	U
15	D	1085	U
15	D	1086	U
15	D	1094	G
15	D	1095	U
15	D	1099	G
15	D	1101	A
15	D	1124	G
15	D	1133	G
15	D	1135	U
15	D	1136	C
15	D	1137	C

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Mol	Chain	Res	Type
15	D	1139	G
15	D	1140	C
15	D	1141	C
15	D	1142	G
15	D	1143	G
15	D	1145	A
15	D	1146	A
15	D	1151	A
15	D	1152	A
15	D	1158	C
15	D	1159	U
15	D	1167	A
15	D	1171	A
15	D	1174	G
15	D	1175	G
15	D	1176	A
15	D	1184	G
15	D	1196	A
15	D	1197	A
15	D	1206	G
15	D	1211	U
15	D	1212	U
15	D	1213	A
15	D	1214	C
15	D	1215	G
15	D	1226	C
15	D	1227	A
15	D	1228	C
15	D	1238	A
15	D	1256	A
15	D	1257	A
15	D	1260	G
15	D	1275	A
15	D	1276	G
15	D	1278	G
15	D	1279	G
15	D	1280	A
15	D	1285	A
15	D	1286	U
15	D	1287	A
15	D	1299	A
15	D	1300	G

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Mol	Chain	Res	Type
15	D	1302	C
15	D	1305	G
15	D	1312	G
15	D	1317	C
15	D	1320	C
15	D	1323	G
15	D	1329	A
15	D	1338	G
15	D	1340	A
15	D	1346	A
15	D	1347	G
15	D	1353	G
15	D	1363	A
15	D	1370	G
15	D	1378	C
15	D	1379	G
15	D	1381	U
15	D	1391	U
15	D	1396	A
15	D	1397	C
15	D	1398	A
15	D	1404	C
15	D	1419	G
15	D	1429	A
15	D	1441	A
15	D	1446	A
15	D	1447	A
15	D	1448	C
15	D	1452	C
15	D	1453	G
15	D	1475	G
15	D	1487	G
15	D	1492	A
15	D	1493	A
15	D	1494	G
15	D	1495	U
15	D	1497	G
15	D	1503	A
15	D	1506	U
15	D	1517	G
15	D	1529	G
15	D	1530	G

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Mol	Chain	Res	Type
15	D	1534	A
36	Y	72	U
36	Y	73	U
37	a	10	A
37	a	15	G
37	a	34	U
37	a	35	G
37	a	46	G
37	a	58	G
37	a	60	G
37	a	63	A
37	a	71	A
37	a	74	A
37	a	75	G
37	a	83	A
37	a	84	A
37	a	85	G
37	a	93	G
37	a	96	C
37	a	102	U
37	a	103	A
37	a	110	G
37	a	114	U
37	a	118	A
37	a	119	A
37	a	120	U
37	a	122	G
37	a	131	A
37	a	136	G
37	a	139	U
37	a	140	C
37	a	141	G
37	a	145	C
37	a	163	C
37	a	165	A
37	a	181	A
37	a	196	A
37	a	200	U
37	a	215	G
37	a	216	A
37	a	222	A
37	a	225	C

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Mol	Chain	Res	Type
37	a	248	G
37	a	249	C
37	a	261	G
37	a	264	C
37	a	265	A
37	a	266	G
37	a	267	C
37	a	271	G
37	a	272	A
37	a	275	C
37	a	276	U
37	a	278	A
37	a	285	G
37	a	311	A
37	a	324	A
37	a	329	G
37	a	330	A
37	a	353	C
37	a	359	G
37	a	361	G
37	a	362	A
37	a	371	A
37	a	372	G
37	a	373	U
37	a	375	G
37	a	383	C
37	a	386	G
37	a	396	G
37	a	405	U
37	a	411	G
37	a	412	A
37	a	420	C
37	a	424	G
37	a	435	C
37	a	451	U
37	a	456	C
37	a	457	A
37	a	477	A
37	a	481	G
37	a	491	G
37	a	501	A
37	a	503	A

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Mol	Chain	Res	Type
37	a	504	A
37	a	505	A
37	a	509	C
37	a	522	A
37	a	529	A
37	a	532	A
37	a	543	G
37	a	546	U
37	a	547	A
37	a	548	G
37	a	549	G
37	a	551	G
37	a	563	A
37	a	569	U
37	a	573	U
37	a	575	A
37	a	588	U
37	a	603	A
37	a	609	A
37	a	613	A
37	a	614	A
37	a	615	U
37	a	616	A
37	a	618	G
37	a	621	A
37	a	627	A
37	a	637	A
37	a	645	C
37	a	647	G
37	a	654	A
37	a	664	G
37	a	668	A
37	a	685	A
37	a	686	U
37	a	710	U
37	a	717	C
37	a	730	A
37	a	738	G
37	a	757	G
37	a	764	A
37	a	765	C
37	a	775	G

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Mol	Chain	Res	Type
37	a	776	G
37	a	782	A
37	a	784	G
37	a	785	G
37	a	800	A
37	a	802	A
37	a	805	G
37	a	812	C
37	a	819	A
37	a	827	U
37	a	828	U
37	a	845	A
37	a	846	U
37	a	858	G
37	a	859	G
37	a	869	G
37	a	878	A
37	a	881	G
37	a	884	U
37	a	885	C
37	a	888	C
37	a	891	G
37	a	892	A
37	a	893	C
37	a	895	U
37	a	896	A
37	a	897	C
37	a	899	A
37	a	907	G
37	a	910	A
37	a	914	G
37	a	915	C
37	a	931	U
37	a	941	A
37	a	945	A
37	a	946	C
37	a	953	G
37	a	961	C
37	a	974	G
37	a	983	A
37	a	995	C
37	a	996	A

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Mol	Chain	Res	Type
37	a	999	U
37	a	1005	C
37	a	1012	U
37	a	1013	C
37	a	1022	G
37	a	1023	U
37	a	1026	G
37	a	1033	U
37	a	1041	G
37	a	1045	C
37	a	1046	A
37	a	1047	G
37	a	1060	U
37	a	1061	U
37	a	1062	G
37	a	1063	G
37	a	1064	C
37	a	1065	U
37	a	1066	U
37	a	1067	A
37	a	1068	G
37	a	1069	A
37	a	1070	A
37	a	1071	G
37	a	1073	A
37	a	1074	G
37	a	1076	C
37	a	1079	C
37	a	1080	A
37	a	1081	U
37	a	1082	U
37	a	1083	U
37	a	1084	A
37	a	1087	G
37	a	1088	A
37	a	1090	A
37	a	1095	A
37	a	1096	A
37	a	1107	G
37	a	1110	G
37	a	1111	A
37	a	1112	G

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Mol	Chain	Res	Type
37	a	1119	U
37	a	1122	G
37	a	1132	U
37	a	1134	A
37	a	1135	C
37	a	1142	A
37	a	1169	A
37	a	1170	C
37	a	1173	U
37	a	1174	U
37	a	1175	A
37	a	1176	U
37	a	1177	G
37	a	1178	C
37	a	1179	G
37	a	1180	U
37	a	1186	G
37	a	1238	G
37	a	1248	G
37	a	1253	A
37	a	1256	G
37	a	1266	G
37	a	1271	G
37	a	1272	A
37	a	1273	U
37	a	1301	A
37	a	1321	A
37	a	1345	C
37	a	1352	U
37	a	1365	A
37	a	1368	G
37	a	1378	A
37	a	1379	U
37	a	1380	G
37	a	1383	A
37	a	1387	A
37	a	1395	A
37	a	1406	U
37	a	1407	G
37	a	1408	G
37	a	1411	U
37	a	1414	C

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Mol	Chain	Res	Type
37	a	1415	U
37	a	1416	G
37	a	1417	C
37	a	1419	A
37	a	1420	A
37	a	1428	C
37	a	1452	G
37	a	1453	A
37	a	1460	U
37	a	1478	G
37	a	1482	G
37	a	1490	A
37	a	1497	U
37	a	1503	A
37	a	1508	A
37	a	1509	A
37	a	1510	G
37	a	1515	A
37	a	1529	G
37	a	1534	U
37	a	1535	A
37	a	1536	C
37	a	1537	G
37	a	1554	U
37	a	1559	U
37	a	1566	A
37	a	1569	A
37	a	1578	U
37	a	1580	A
37	a	1581	G
37	a	1582	C
37	a	1583	A
37	a	1584	U
37	a	1589	U
37	a	1590	A
37	a	1608	A
37	a	1609	A
37	a	1610	A
37	a	1647	U
37	a	1648	U
37	a	1649	G
37	a	1651	G

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Mol	Chain	Res	Type
37	a	1674	G
37	a	1677	A
37	a	1703	G
37	a	1714	U
37	a	1715	G
37	a	1718	G
37	a	1729	U
37	a	1730	C
37	a	1732	C
37	a	1738	G
37	a	1750	G
37	a	1755	A
37	a	1758	U
37	a	1764	C
37	a	1773	A
37	a	1791	A
37	a	1800	C
37	a	1801	A
37	a	1808	A
37	a	1811	G
37	a	1816	C
37	a	1829	A
37	a	1833	C
37	a	1847	A
37	a	1848	A
37	a	1858	A
37	a	1859	U
37	a	1862	G
37	a	1864	U
37	a	1869	G
37	a	1870	C
37	a	1872	A
37	a	1873	G
37	a	1905	C
37	a	1906	G
37	a	1907	G
37	a	1913	A
37	a	1914	C
37	a	1919	A
37	a	1920	C
37	a	1922	G
37	a	1923	U

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Mol	Chain	Res	Type
37	a	1924	C
37	a	1925	C
37	a	1926	U
37	a	1928	A
37	a	1929	G
37	a	1930	G
37	a	1936	A
37	a	1938	A
37	a	1955	U
37	a	1965	C
37	a	1967	C
37	a	1970	A
37	a	1971	U
37	a	1972	G
37	a	1987	A
37	a	1991	U
37	a	1992	G
37	a	1993	U
37	a	1997	C
37	a	2002	G
37	a	2022	U
37	a	2023	C
37	a	2027	G
37	a	2033	A
37	a	2043	C
37	a	2051	A
37	a	2052	A
37	a	2055	C
37	a	2056	G
37	a	2060	A
37	a	2061	G
37	a	2062	A
37	a	2077	A
37	a	2097	A
37	a	2099	U
37	a	2100	G
37	a	2108	A
37	a	2110	G
37	a	2111	U
37	a	2113	U
37	a	2115	G
37	a	2116	G

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Mol	Chain	Res	Type
37	a	2117	A
37	a	2118	U
37	a	2121	G
37	a	2122	U
37	a	2124	G
37	a	2125	G
37	a	2126	A
37	a	2127	G
37	a	2128	G
37	a	2131	U
37	a	2132	U
37	a	2133	G
37	a	2134	A
37	a	2139	U
37	a	2141	G
37	a	2146	C
37	a	2147	A
37	a	2154	A
37	a	2157	G
37	a	2158	A
37	a	2159	G
37	a	2162	G
37	a	2163	A
37	a	2164	C
37	a	2165	C
37	a	2169	A
37	a	2171	A
37	a	2172	U
37	a	2178	C
37	a	2182	U
37	a	2183	A
37	a	2185	U
37	a	2188	U
37	a	2189	U
37	a	2190	G
37	a	2191	A
37	a	2193	G
37	a	2194	U
37	a	2198	A
37	a	2204	G
37	a	2210	U
37	a	2211	A

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Mol	Chain	Res	Type
37	a	2212	A
37	a	2213	U
37	a	2225	A
37	a	2226	C
37	a	2229	U
37	a	2238	G
37	a	2239	G
37	a	2244	U
37	a	2250	G
37	a	2268	A
37	a	2278	A
37	a	2283	C
37	a	2287	A
37	a	2297	A
37	a	2305	U
37	a	2308	G
37	a	2309	A
37	a	2315	G
37	a	2322	A
37	a	2325	G
37	a	2327	A
37	a	2333	A
37	a	2339	C
37	a	2345	G
37	a	2347	C
37	a	2350	C
37	a	2361	G
37	a	2372	U
37	a	2376	A
37	a	2383	G
37	a	2385	C
37	a	2402	U
37	a	2403	C
37	a	2406	A
37	a	2423	U
37	a	2424	C
37	a	2425	A
37	a	2426	A
37	a	2429	G
37	a	2430	A
37	a	2431	U
37	a	2434	A

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Mol	Chain	Res	Type
37	a	2435	A
37	a	2441	U
37	a	2447	G
37	a	2448	A
37	a	2470	G
37	a	2474	U
37	a	2476	A
37	a	2478	A
37	a	2484	G
37	a	2491	U
37	a	2502	G
37	a	2506	U
37	a	2507	C
37	a	2512	C
37	a	2513	A
37	a	2518	A
37	a	2520	C
37	a	2525	G
37	a	2529	G
37	a	2535	G
37	a	2547	A
37	a	2554	U
37	a	2566	A
37	a	2567	G
37	a	2572	A
37	a	2573	C
37	a	2574	G
37	a	2585	U
37	a	2586	U
37	a	2602	A
37	a	2603	G
37	a	2609	U
37	a	2610	C
37	a	2611	C
37	a	2613	U
37	a	2629	U
37	a	2663	G
37	a	2669	G
37	a	2671	G
37	a	2689	U
37	a	2690	U
37	a	2714	G

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Mol	Chain	Res	Type
37	a	2722	G
37	a	2726	A
37	a	2744	G
37	a	2748	A
37	a	2757	A
37	a	2758	A
37	a	2765	A
37	a	2777	G
37	a	2778	A
37	a	2791	G
37	a	2793	C
37	a	2796	U
37	a	2797	U
37	a	2798	U
37	a	2799	A
37	a	2801	G
37	a	2818	U
37	a	2820	A
37	a	2823	A
37	a	2825	G
37	a	2849	U
37	a	2850	A
37	a	2859	G
37	a	2861	U
37	a	2867	G
37	a	2880	C
37	a	2884	U
37	a	2885	G
37	a	2891	U
37	a	2902	C
40	d	2	G
40	d	9	G
40	d	13	G
40	d	16	G
40	d	17	C
40	d	35	C
40	d	36	C
40	d	45	A
40	d	51	G
40	d	56	G
40	d	64	G
40	d	66	A

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Mol	Chain	Res	Type
40	d	88	C
40	d	89	U
40	d	90	C
40	d	99	A
40	d	109	A

All (47) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
9	A	6	G
9	A	7	G
9	A	9	G
9	A	22	G
9	A	60	U
9	A	70	G
9	B	6	G
9	B	7	G
9	B	9	G
9	B	22	G
9	B	37	A
9	B	60	U
15	D	7	A
15	D	70	U
15	D	121	U
15	D	181	A
15	D	183	C
15	D	197	A
15	D	209	U
15	D	305	G
15	D	328	C
15	D	428	G
15	D	496	A
15	D	517	G
15	D	531	U
15	D	532	A
15	D	562	U
15	D	641	U
15	D	722	G
15	D	793	U
15	D	991	U
15	D	992	U
15	D	1109	C

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Mol	Chain	Res	Type
15	D	1145	A
15	D	1196	A
15	D	1211	U
15	D	1212	U
15	D	1213	A
15	D	1214	C
15	D	1225	A
15	D	1299	A
15	D	1396	A
15	D	1432	G
15	D	1447	A
15	D	1491	G
15	D	1492	A
15	D	1493	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 [i](#)

Of 3 ligands modelled in this entry, 3 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 [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues

There are no chain breaks in this entry.

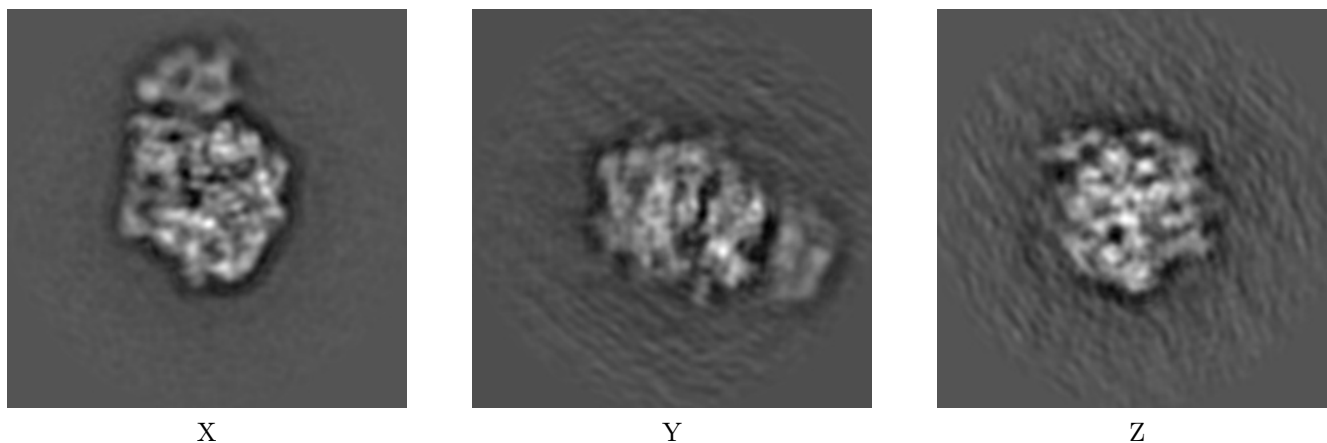
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-21471. 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](#)

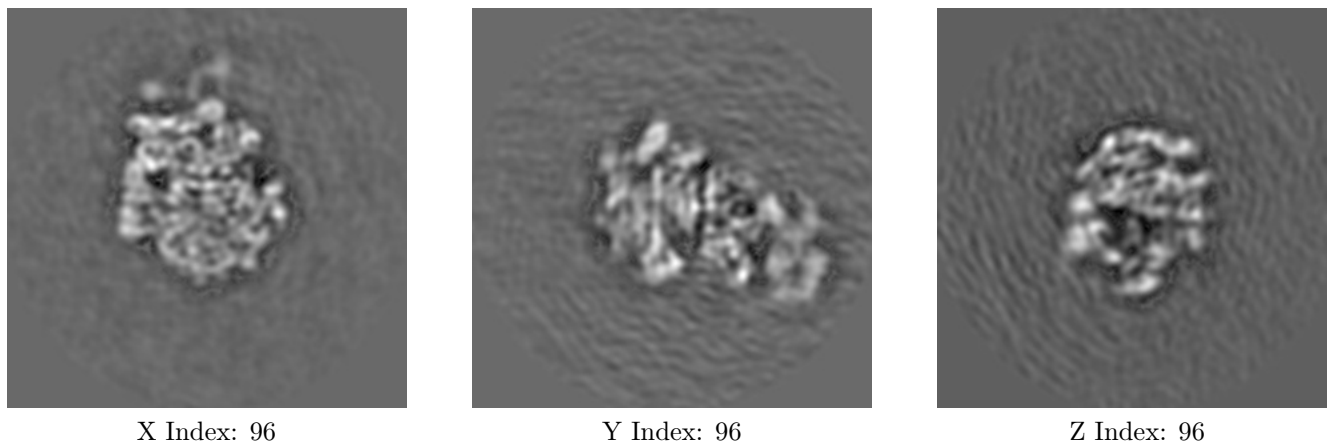
6.1.1 Primary map



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

6.2 Central slices [i](#)

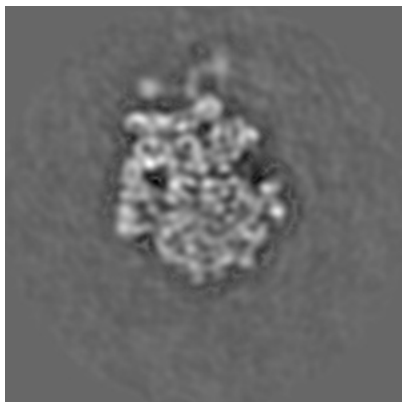
6.2.1 Primary map



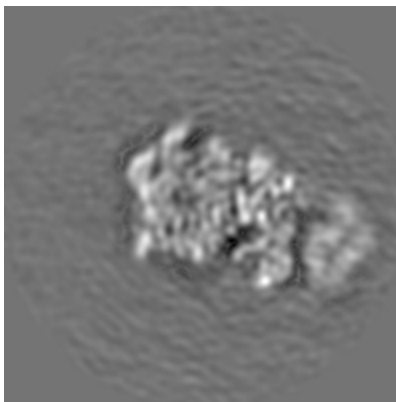
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

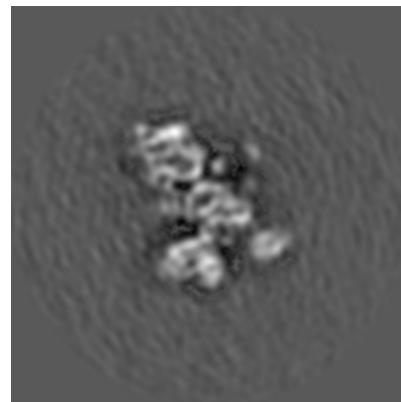
6.3.1 Primary map



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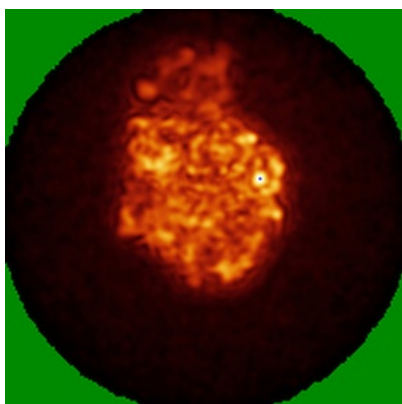


Z Index: 115

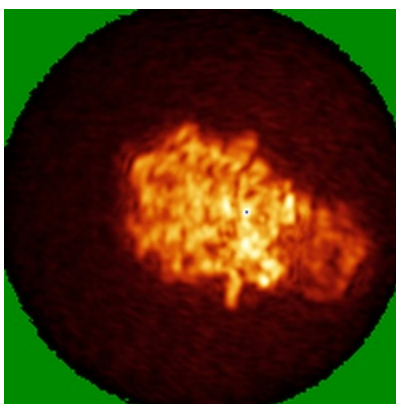
The images above show the largest variance slices of the map in three orthogonal directions.

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

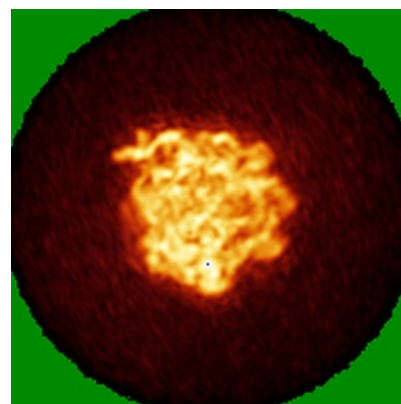
6.4.1 Primary map



X



Y

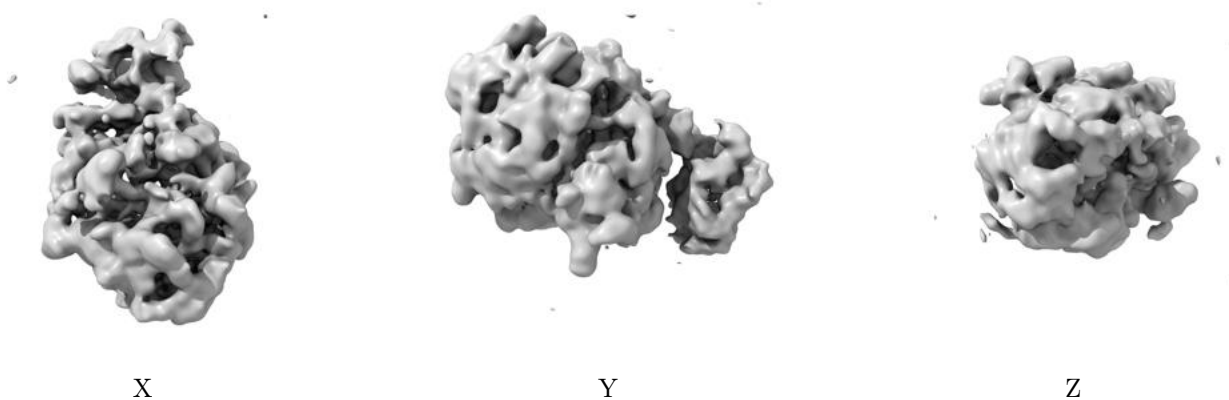


Z

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

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.0168. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

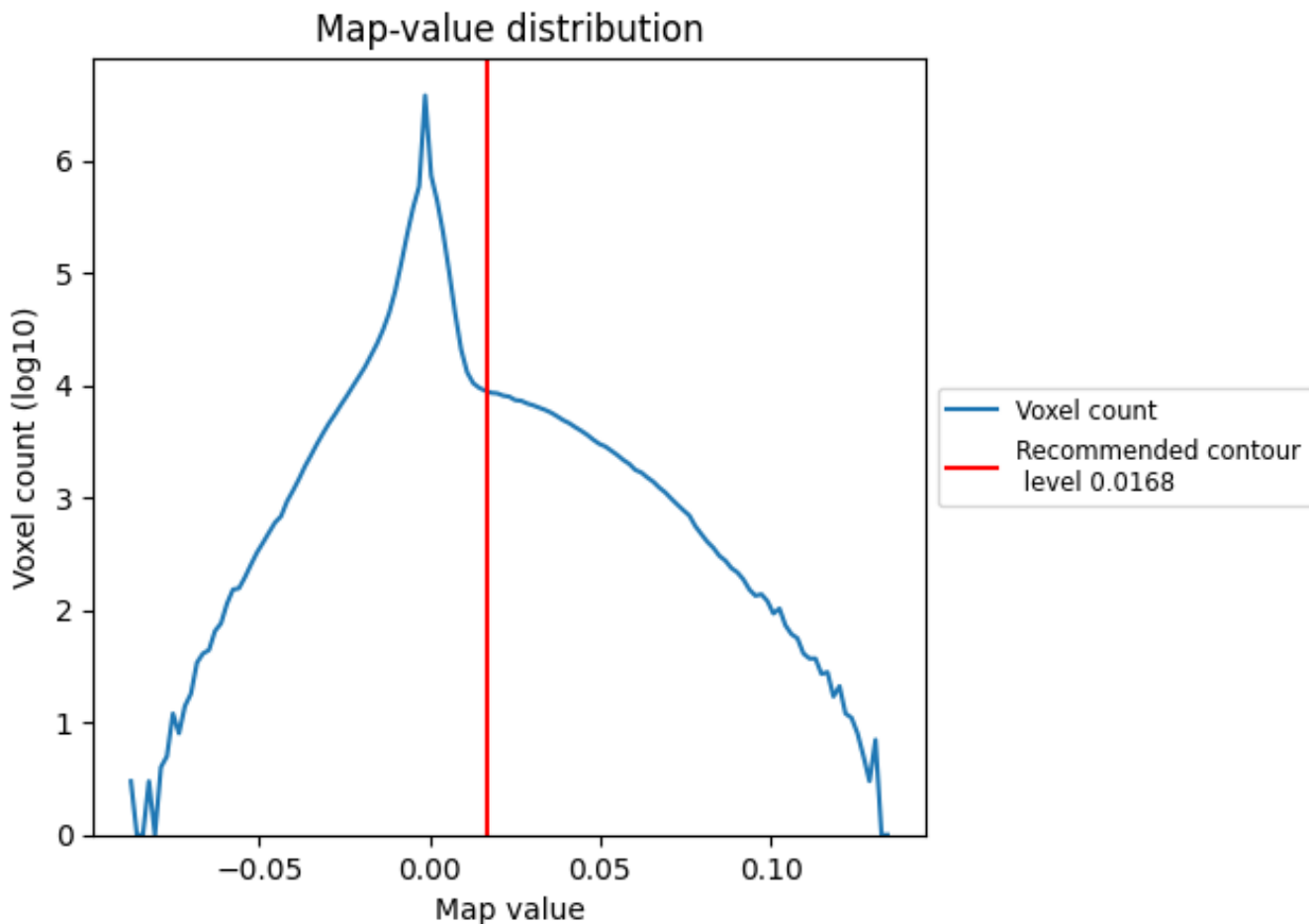
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

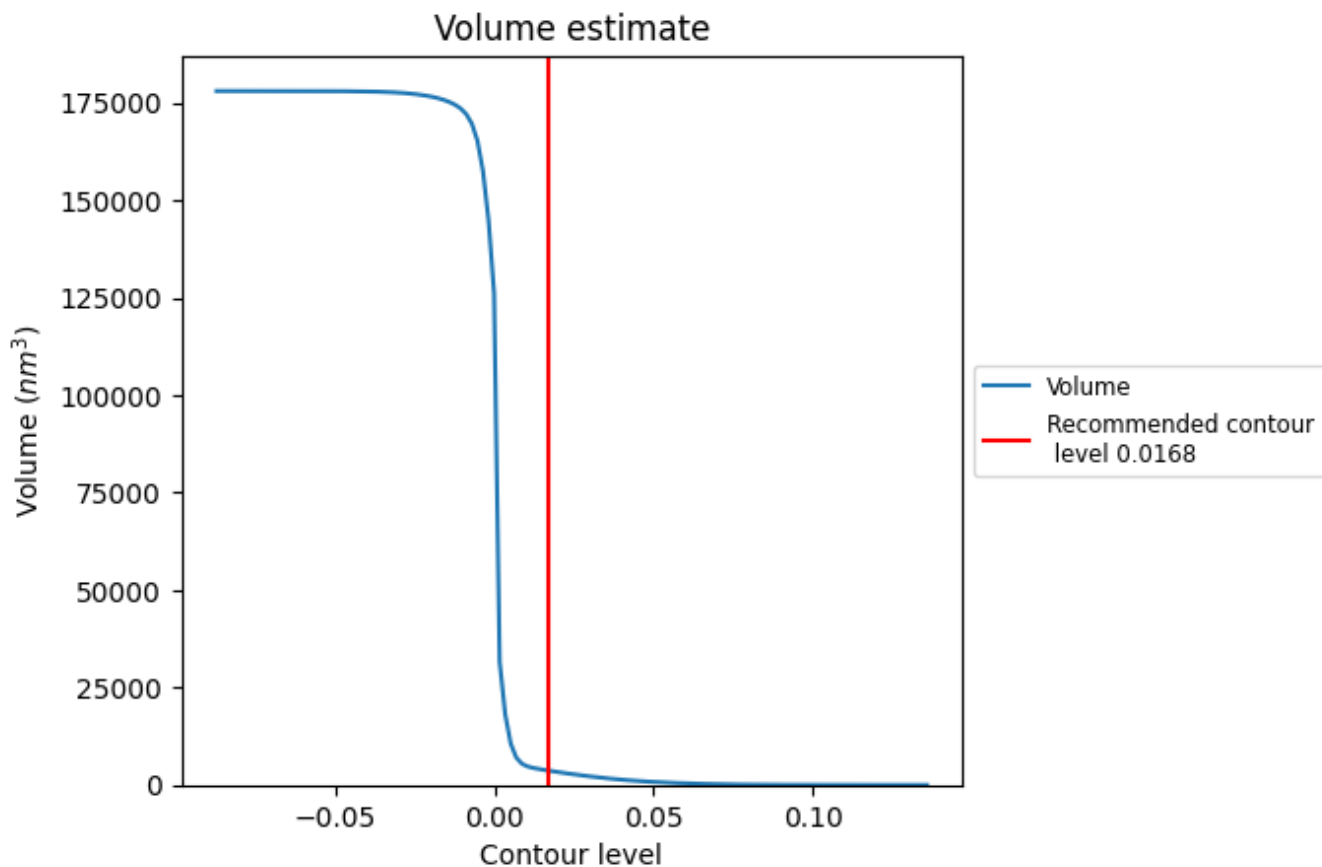
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution [i](#)



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

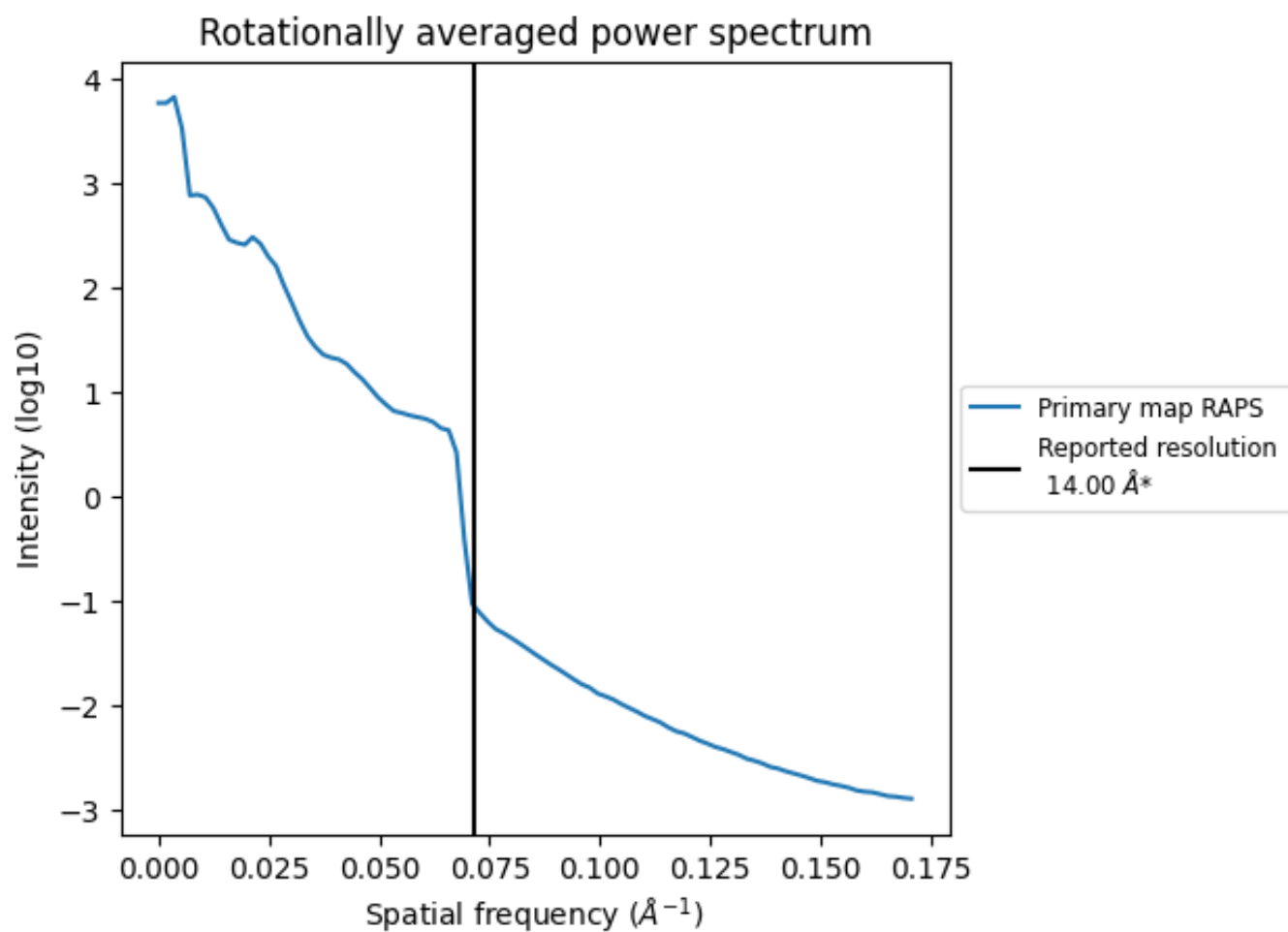
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 3685 nm^3 ; this corresponds to an approximate mass of 3329 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 0.071\AA^{-1}

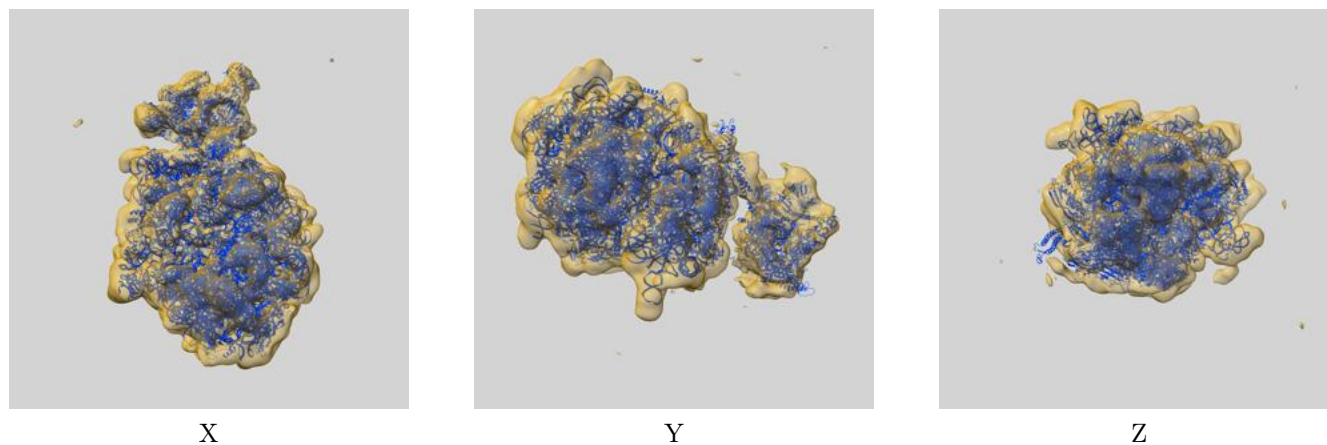
8 Fourier-Shell correlation

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

9 Map-model fit [i](#)

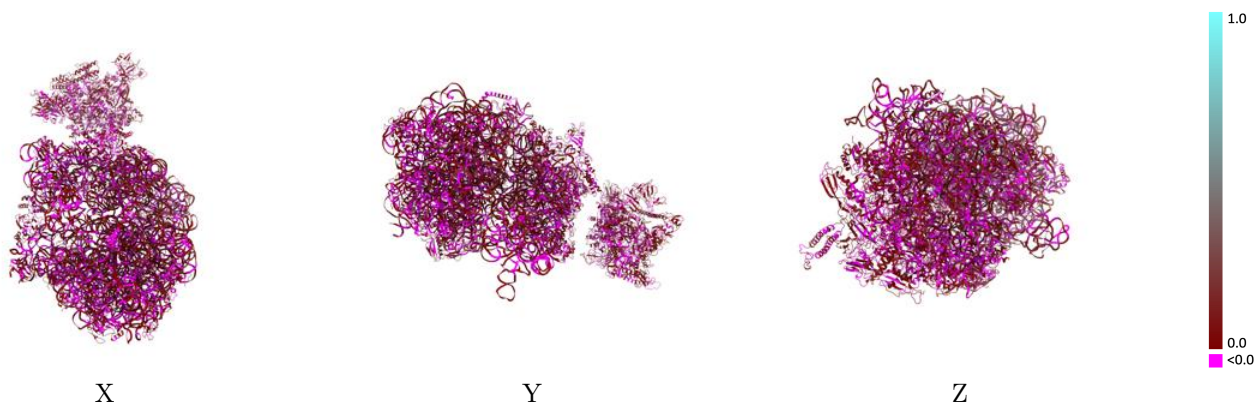
This section contains information regarding the fit between EMDB map EMD-21471 and PDB model 6VYT. Per-residue inclusion information can be found in section 3 on page 16.

9.1 Map-model overlay [i](#)



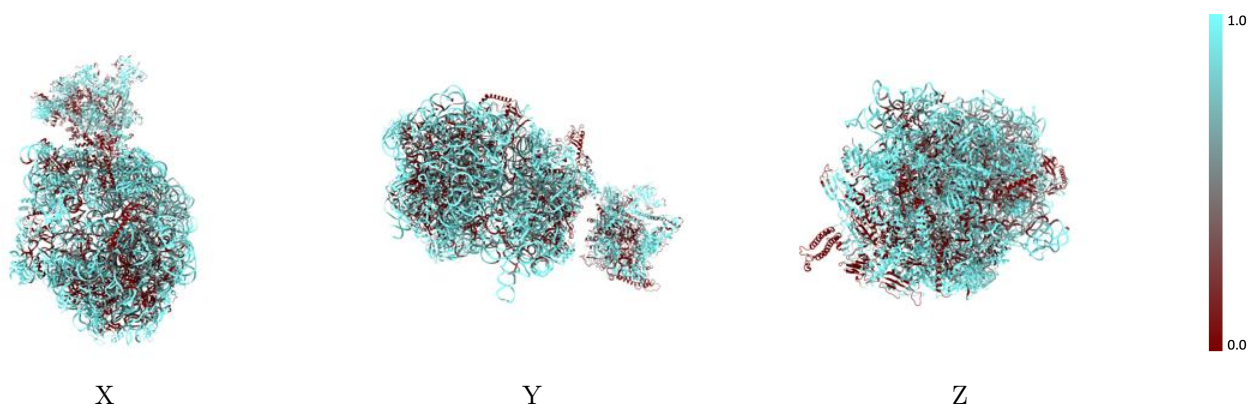
The images above show the 3D surface view of the map at the recommended contour level 0.0168 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



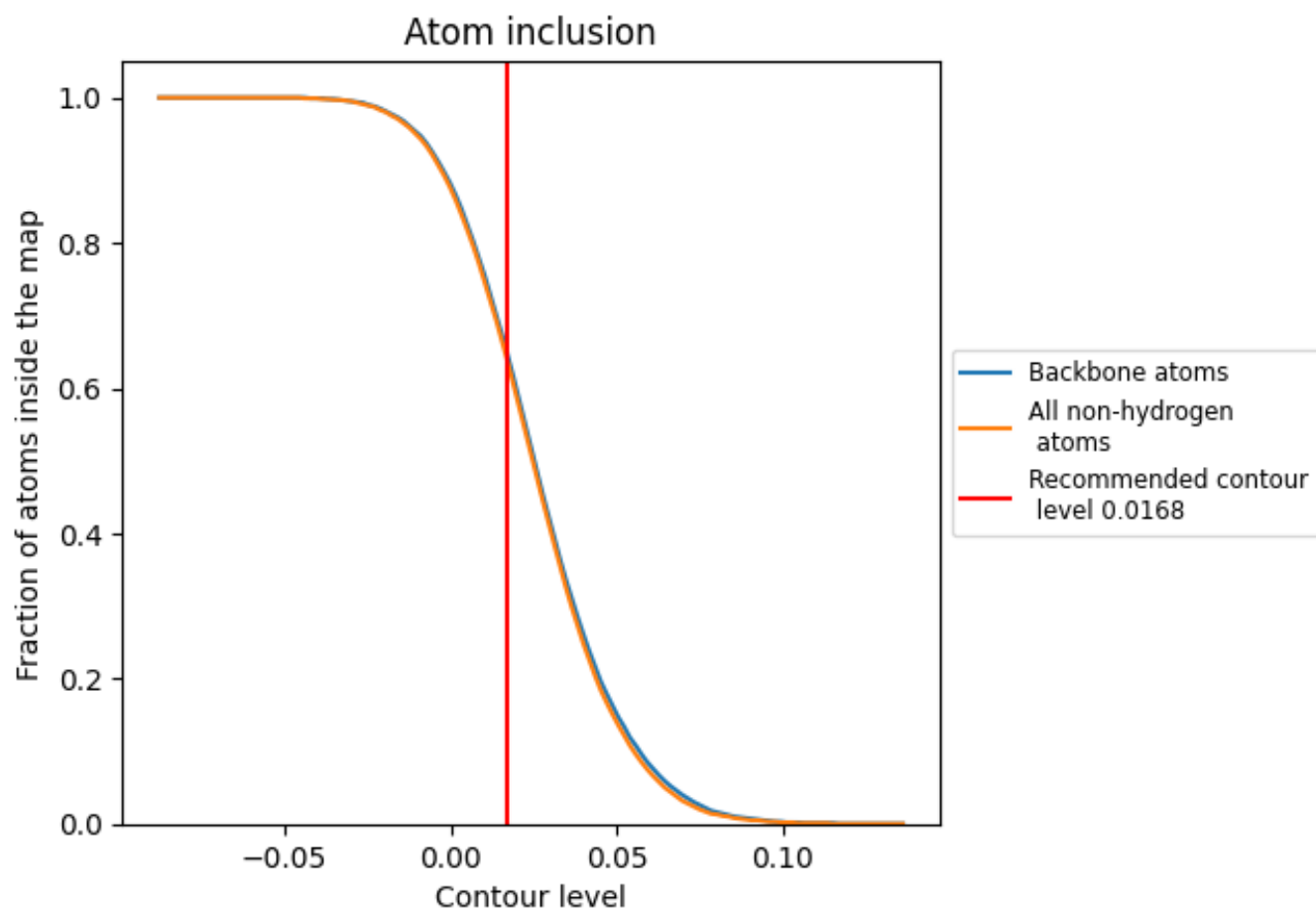
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.0168).







































































9.4 Atom inclusion [i](#)



At the recommended contour level, 65% of all backbone atoms, 64% 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 (0.0168) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.6430	 0.0360
0	 0.7880	 0.0110
1	 0.3040	 -0.0030
2	 0.5820	 -0.0040
3	 0.8330	 0.0340
4	 0.7860	 0.0510
5	 0.4000	 0.0600
6	 0.3100	 0.0170
7	 0.0140	 -0.0160
A	 0.4230	 0.0400
AA	 0.5920	 0.0400
AB	 0.6800	 0.0570
AC	 0.3500	 0.0090
AD	 0.6830	 0.0230
AE	 0.6510	 0.0440
B	 0.5540	 0.0340
C	 0.9100	 0.0520
D	 0.7460	 0.0470
E	 0.6020	 0.0000
F	 0.2220	 0.0340
G	 0.6610	 0.0300
H	 0.2280	 0.0170
I	 0.3690	 0.0120
J	 0.5640	 0.0150
K	 0.5570	 0.0270
L	 0.9100	 0.0660
M	 0.6940	 0.0280
N	 0.6590	 0.0100
O	 0.5690	 -0.0210
P	 0.4220	 -0.0130
Q	 0.7610	 0.0430
R	 0.3910	 0.0010
S	 0.6420	 0.0210
T	 0.8520	 0.0500
U	 0.6540	 0.0100



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Chain	Atom inclusion	Q-score
V	 0.5900	 0.0600
W	 0.7970	 0.0170
X	 0.7030	 0.0150
Y	 0.0000	 -0.0080
a	 0.6870	 0.0450
b	 0.6930	 -0.0050
c	 0.4310	 0.0150
d	 0.6090	 0.0080
e	 0.7440	 0.0170
f	 0.3140	 -0.0320
g	 0.6440	 0.0260
h	 0.3930	 0.0250
i	 0.6870	 0.0040
j	 0.5870	 0.0030
k	 0.7030	 0.0040
l	 0.4870	 0.0150
m	 0.5130	 0.0500
n	 0.6310	 0.0410
o	 0.2690	 -0.0210
p	 0.9000	 0.0390
q	 0.6440	 -0.0420
r	 0.1550	 -0.0140
s	 0.3290	 -0.0150
t	 0.3750	 0.0300
u	 0.7120	 0.0010
v	 0.5630	 0.0140
w	 0.5510	 -0.0190
x	 0.8420	 0.0090
y	 0.4340	 -0.0080
z	 0.6530	 -0.0080