



Full wwPDB EM Validation Report ⓘ

Mar 4, 2023 – 01:40 PM EST

PDB ID : 7SFR
EMDB ID : EMD-25100
Title : Unmethylated Mtb Ribosome 50S with SEQ-9
Authors : Xing, Z.; Cui, Z.; Zhang, J.; TB Structural Genomics Consortium (TBSGC)
Deposited on : 2021-10-04
Resolution : 2.60 Å (reported)
Based on initial model : 7KGB

This is a Full wwPDB EM Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/EMValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

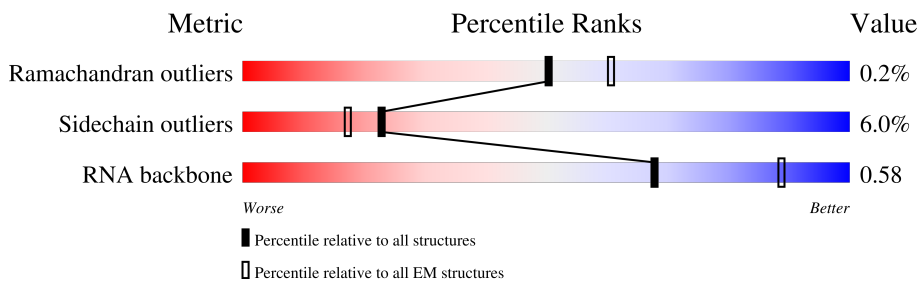
EMDB validation analysis : 0.0.1.dev43
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.32.1

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 2.60 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



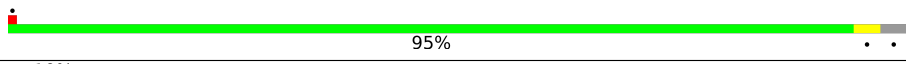
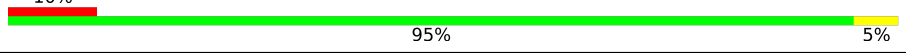
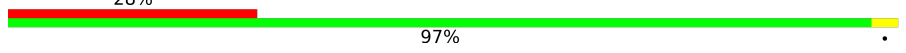
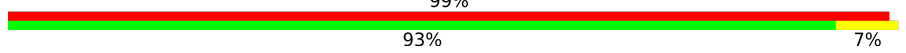
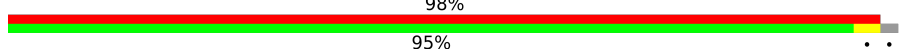


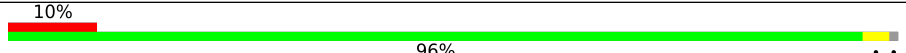
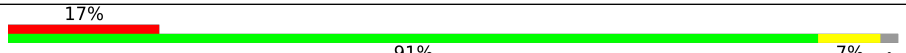
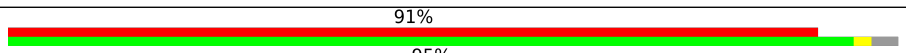
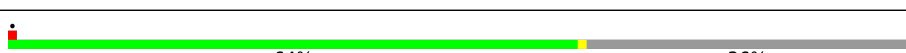

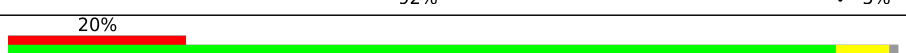
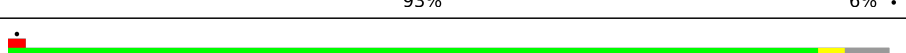
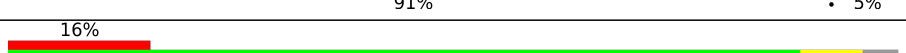

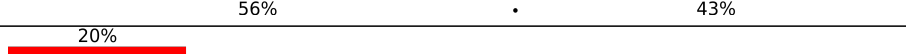
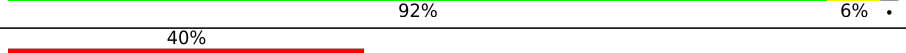



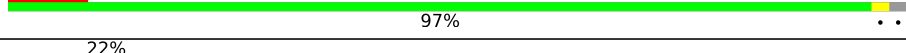

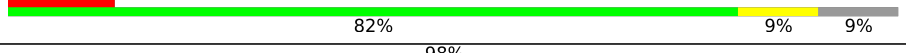

Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826
RNA backbone	4643	859

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion $< 40\%$). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	0	57	
2	1	55	
3	2	47	
4	3	64	
5	4	37	
6	6	80	
7	A	3138	
8	B	115	

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Mol	Chain	Length	Quality of chain
9	C	279	 95%
10	D	213	 10% 95% 5%
11	E	207	 28% 97%
12	F	178	 99% 93% 7%
13	G	177	 98% 95%
14	H	152	 31% 26% 5% 69%
15	J	195	 72% 25%
16	K	122	 10% 96%
17	L	146	 17% 91% 7%
18	M	138	 91% 95%
19	N	180	 64% 36%
20	O	122	 72% 92% 5%
21	P	113	 20% 93% 6%
22	Q	129	 91% 5%
23	R	104	 16% 89% 7%
24	S	197	 56% 43%
25	T	100	 20% 92% 6%
26	U	105	 40% 75% 9% 14%
27	V	215	 43% 41% 56%
28	W	86	 5% 80% 17%
29	X	64	 9% 97%
30	Y	77	 22% 82% 16%
31	Z	65	 12% 82% 9% 9%
32	a	1537	 98% 84% 15%
33	c	274	 76% 70% 5% 24%

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Mol	Chain	Length	Quality of chain
34	d	201	100% 95%
35	e	220	73% 69% 27%
36	f	96	99% 90% 9%
37	g	156	97% 92% 6%
38	h	132	98% 92% 5%
39	i	151	84% 79% 5% 16%
40	j	101	98% 92% 6%
41	k	139	84% 78% 6% 16%
42	l	124	98% 94%
43	m	124	94% 86% 7% 6%
44	n	61	98% 95%
45	o	89	98% 93%
46	p	162	56% 53% 44%
47	q	135	69% 64% 5% 31%
48	r	84	75% 71% 25%
49	s	93	89% 84% 5% 11%
50	t	86	95% 91% 5% 5%
51	v	22	100% 95% 5%

2 Entry composition

There are 54 unique types of molecules in this entry. The entry contains 143665 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 protein called 50S ribosomal protein L32.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
1	0	54	429	266	94	69	0	0

- Molecule 2 is a protein called 50S ribosomal protein L33.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	1	48	400	245	84	67	4	0	0

- Molecule 3 is a protein called 50S ribosomal protein L34.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	2	42	358	212	94	51	1	0	0

- Molecule 4 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
4	3	62	494	298	112	84	0	0

- Molecule 5 is a protein called 50S ribosomal protein L36.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	4	37	299	182	66	47	4	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
4	1	VAL	MET	conflict	UNP A0A3E0V5U0

- Molecule 6 is a protein called 50S ribosomal protein L31.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	6	57	Total	C	N	O	S	0	0
			446	277	82	82	5		

- Molecule 7 is a RNA chain called 23S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	A	3118	Total	C	N	O	P	0	0
			66961	29850	12340	21653	3118		

- Molecule 8 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	B	115	Total	C	N	O	P	0	0
			2458	1097	456	790	115		

- Molecule 9 is a protein called 50S ribosomal protein L2.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	C	272	Total	C	N	O	S	0	0
			2088	1277	437	369	5		

- Molecule 10 is a protein called 50S ribosomal protein L3.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	D	213	Total	C	N	O	S	0	0
			1590	985	307	292	6		

- Molecule 11 is a protein called 50S ribosomal protein L4.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	E	207	Total	C	N	O	S	0	0
			1552	958	303	289	2		

- Molecule 12 is a protein called 50S ribosomal protein L5.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	F	178	Total	C	N	O	S	0	0
			1408	885	267	251	5		

- Molecule 13 is a protein called 50S ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	G	174	1330	836	249	244	1	0	0

- Molecule 14 is a protein called 50S ribosomal protein L9.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
14	H	47	350	220	64	65	1	0	0

- Molecule 15 is a protein called 50S ribosomal protein L13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
15	J	146	1143	724	217	199	3	0	0

- Molecule 16 is a protein called 50S ribosomal protein L14.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
16	K	121	934	585	179	168	2	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
K	1	VAL	MET	conflict	UNP A0A045HTP7

- Molecule 17 is a protein called 50S ribosomal protein L15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
17	L	143	1068	662	216	188	2	0	0

- Molecule 18 is a protein called 50S ribosomal protein L16.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
18	M	134	1072	679	215	177	1	0	0

- Molecule 19 is a protein called 50S ribosomal protein L17.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
19	N	116	908	574	175	158	1	0	0

- Molecule 20 is a protein called 50S ribosomal protein L18.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
20	O	116	886	541	188	157		0	0

- Molecule 21 is a protein called 50S ribosomal protein L19.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
21	P	112	907	573	174	159	1	0	0

- Molecule 22 is a protein called 50S ribosomal protein L20.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
22	Q	122	980	608	205	167		0	0

- Molecule 23 is a protein called 50S ribosomal protein L21.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
23	R	100	757	482	138	137		0	0

- Molecule 24 is a protein called 50S ribosomal protein L22.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
24	S	113	860	533	178	149		0	0

- Molecule 25 is a protein called 50S ribosomal protein L23.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
25	T	98	759	480	141	138		0	0

- Molecule 26 is a protein called 50S ribosomal protein L24.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
26	U	90	699	430	138	129	2	0	0

- Molecule 27 is a protein called 50S ribosomal protein L25.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
27	V	95	735	456	152	127		0	0

- Molecule 28 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
28	W	71	526	325	108	93		0	0

- Molecule 29 is a protein called 50S ribosomal protein L28.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
29	X	63	476	289	101	81	5	0	0

- Molecule 30 is a protein called 50S ribosomal protein L29.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
30	Y	65	541	331	106	103	1	0	0

- Molecule 31 is a protein called 50S ribosomal protein L30.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
31	Z	59	476	293	101	82		0	0

- Molecule 32 is a RNA chain called 16S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
32	a	1519	32621	14536	5961	10605	1519	0	0

- Molecule 33 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	c	207	Total	C	N	O	S	0	0
			1654	1030	322	298	4		

- Molecule 34 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	d	200	Total	C	N	O	S	0	0
			1650	1036	316	296	2		

- Molecule 35 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	e	160	Total	C	N	O	S	0	0
			1149	726	214	206	3		

- Molecule 36 is a protein called 30S ribosomal protein S6.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	f	95	Total	C	N	O	S	0	0
			757	480	133	141	3		

- Molecule 37 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	g	152	Total	C	N	O	S	0	0
			1193	742	234	215	2		

- Molecule 38 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	h	130	Total	C	N	O	S	0	0
			999	627	187	184	1		

- Molecule 39 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms				AltConf	Trace
39	i	127	Total	C	N	O	0	0
			993	628	195	170		

- Molecule 40 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
40	j	99	789	496	146	144	3	0	0

- Molecule 41 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
41	k	117	873	540	175	158		0	0

- Molecule 42 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
42	l	122	959	594	197	166	2	0	0

- Molecule 43 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
43	m	116	945	578	196	168	3	0	0

- Molecule 44 is a protein called 30S ribosomal protein S14 type Z.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
44	n	60	468	294	96	73	5	0	0

- Molecule 45 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
45	o	87	718	449	144	125		0	0

- Molecule 46 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
46	p	91	728	462	140	126		0	0

- Molecule 47 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	q	93	Total	C	N	O	S	0	0
			754	471	149	131	3		

- Molecule 48 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace
48	r	63	Total	C	N	O	S	0	0
			497	309	96	89	3		

- Molecule 49 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
49	s	83	Total	C	N	O	S	0	0
			672	432	125	114	1		

- Molecule 50 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms				AltConf	Trace
50	t	82	Total	C	N	O	0	0
			631	381	137	113		

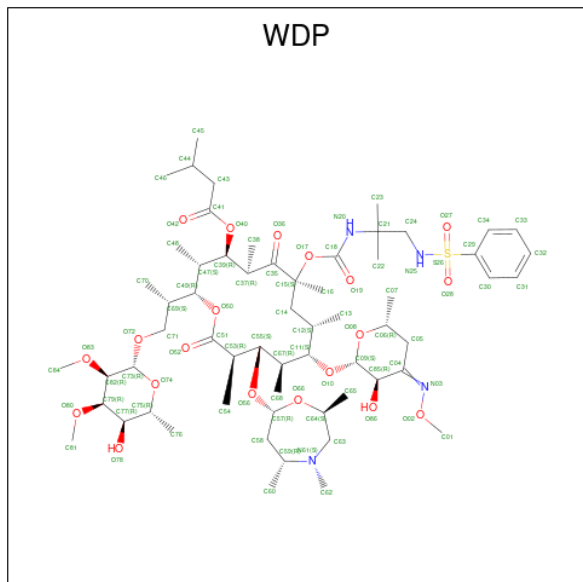
- Molecule 51 is a protein called peptide.

Mol	Chain	Residues	Atoms				AltConf	Trace
51	v	22	Total	C	N	O	0	0
			186	111	47	28		

- Molecule 52 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
52	1	1	Total	Zn	0
			1	1	
52	4	1	Total	Zn	0
			1	1	
52	6	1	Total	Zn	0
			1	1	
52	X	1	Total	Zn	0
			1	1	
52	n	1	Total	Zn	0
			1	1	
52	r	1	Total	Zn	0
			1	1	

- Molecule 53 is Sequanamycin 9 (three-letter code: WDP) (formula: $C_{61}H_{102}N_4O_{20}S$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	S	
53	A	1	86	61	4	20	1	0

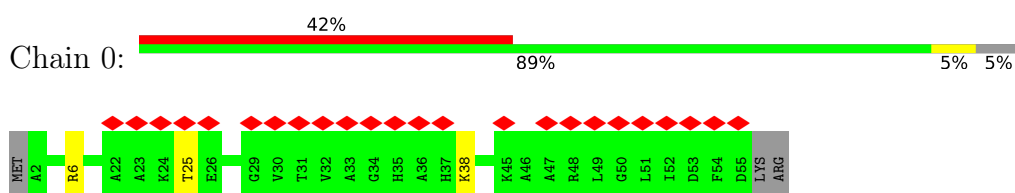
- Molecule 54 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
			Total	Mg	
54	A	307	307	307	0
54	B	7	7	7	0
54	C	3	3	3	0
54	D	1	1	1	0
54	L	1	1	1	0
54	M	1	1	1	0
54	a	125	125	125	0
54	e	1	1	1	0
54	t	1	1	1	0

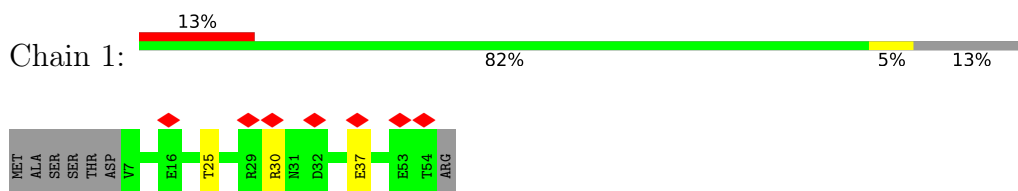
3 Residue-property plots [i](#)

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.

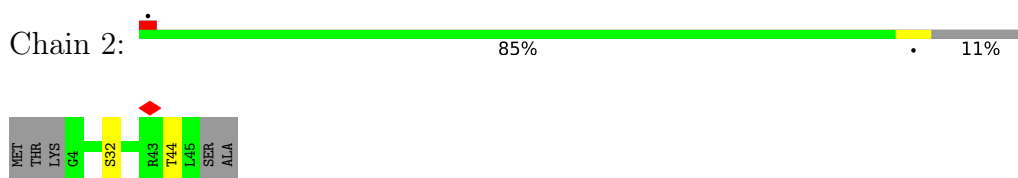
- Molecule 1: 50S ribosomal protein L32



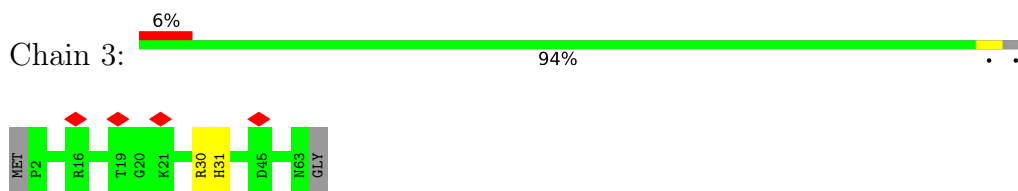
- Molecule 2: 50S ribosomal protein L33



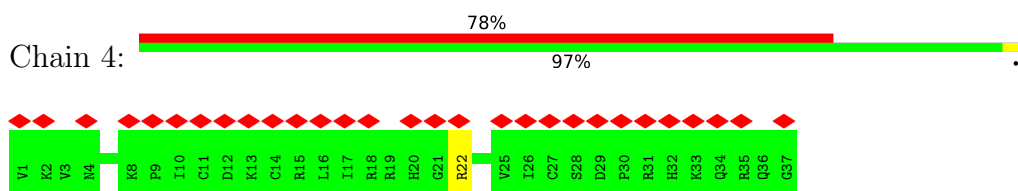
- Molecule 3: 50S ribosomal protein L34



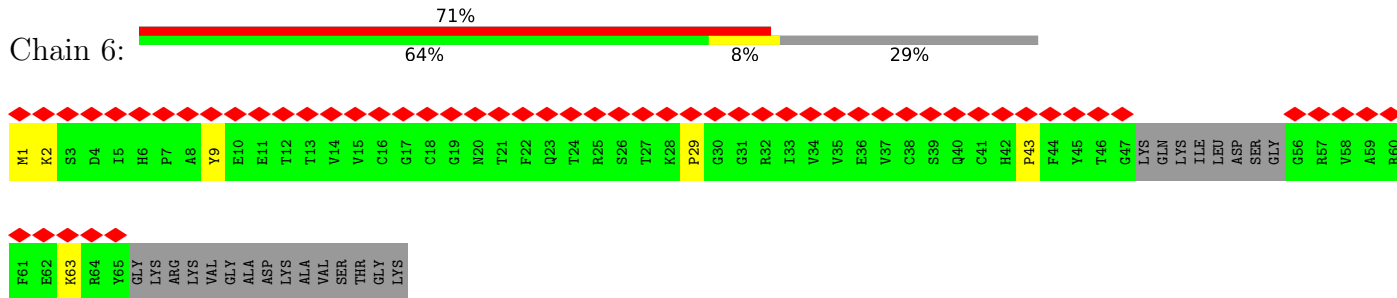
- Molecule 4: 50S ribosomal protein L35



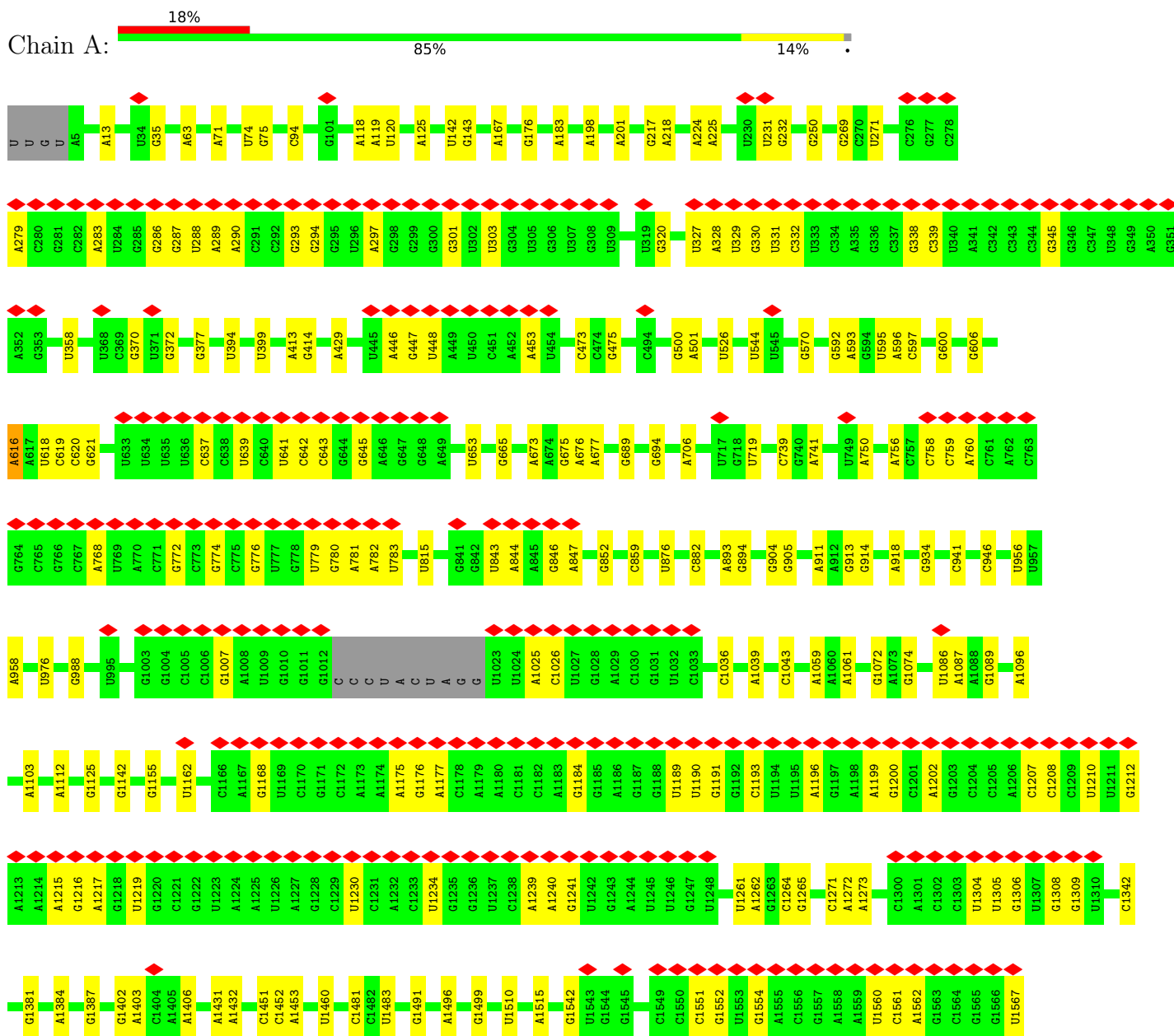
- Molecule 5: 50S ribosomal protein L36

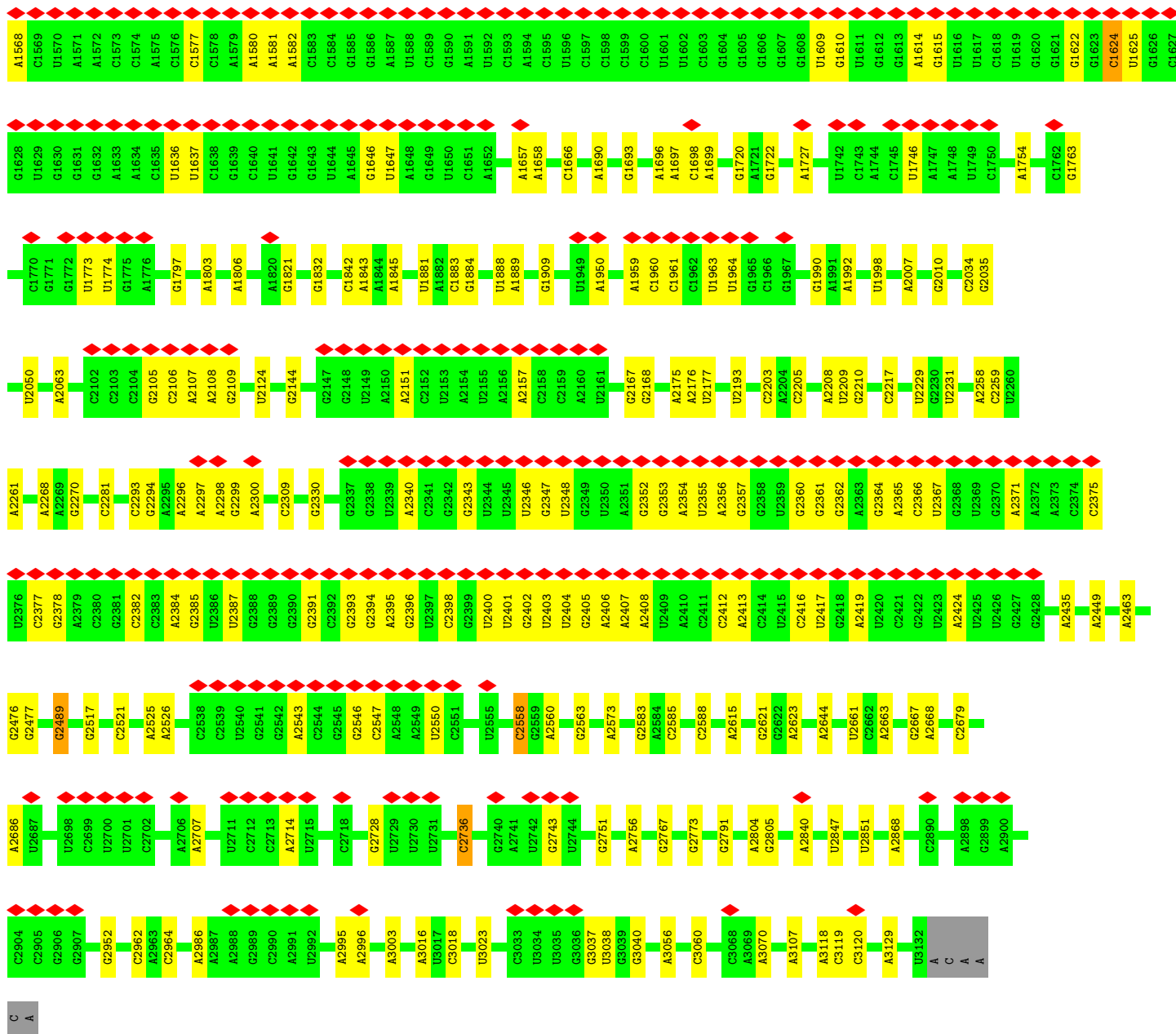


• Molecule 6: 50S ribosomal protein L31

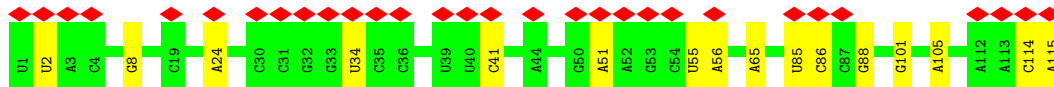
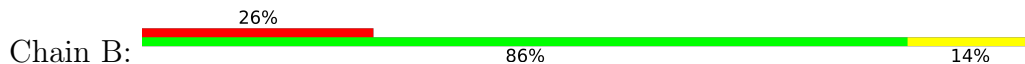


• Molecule 7: 23S rRNA





• Molecule 8: 5S rRNA

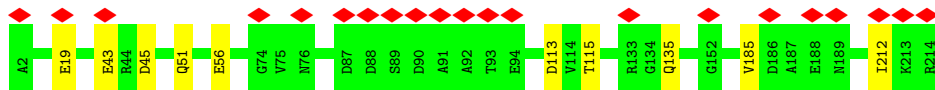
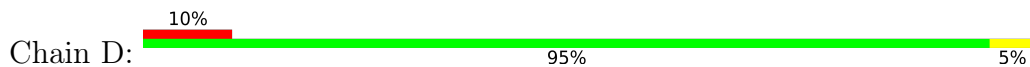


• Molecule 9: 50S ribosomal protein L2

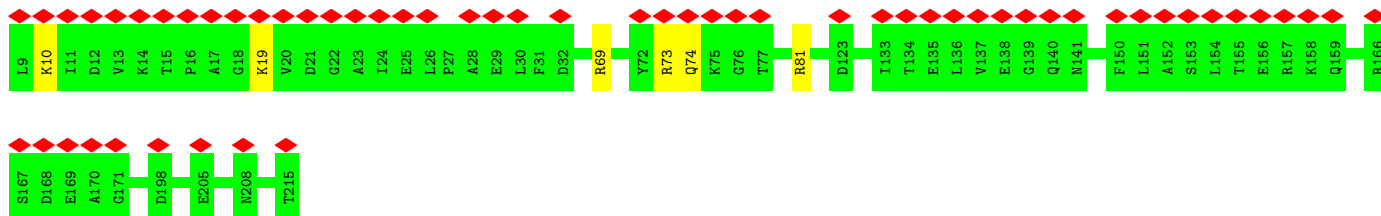




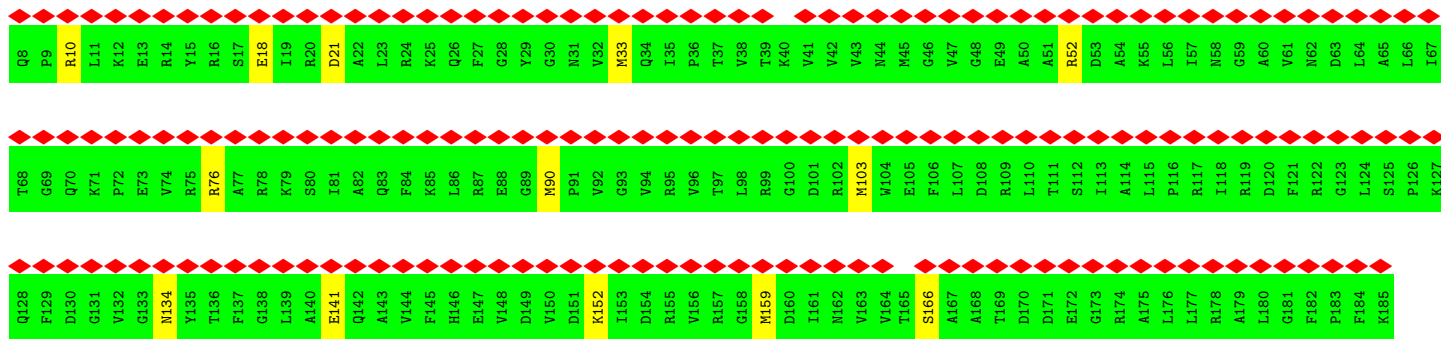
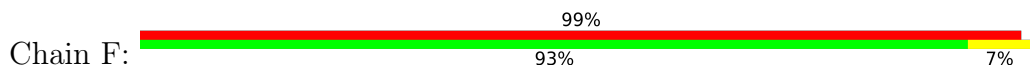
• Molecule 10: 50S ribosomal protein L3



• Molecule 11: 50S ribosomal protein L4

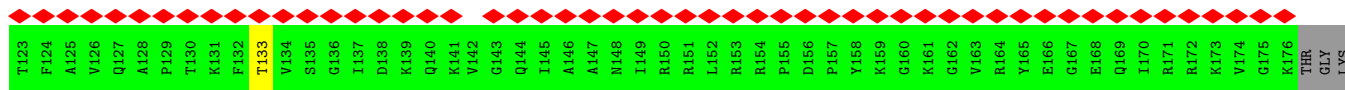


• Molecule 12: 50S ribosomal protein L5

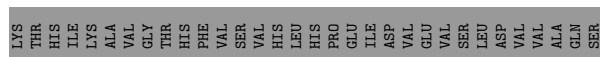
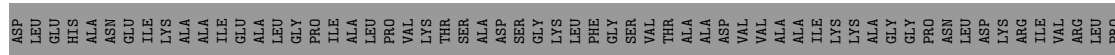
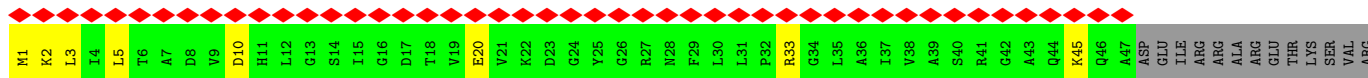


• Molecule 13: 50S ribosomal protein L6

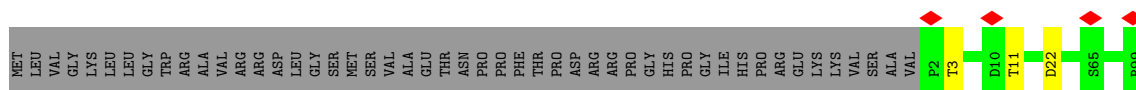




• Molecule 14: 50S ribosomal protein L9



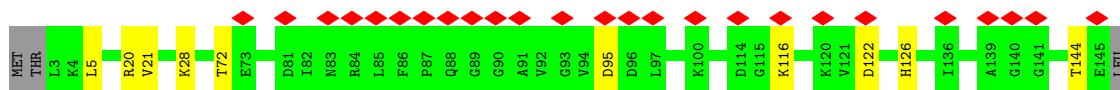
• Molecule 15: 50S ribosomal protein L13



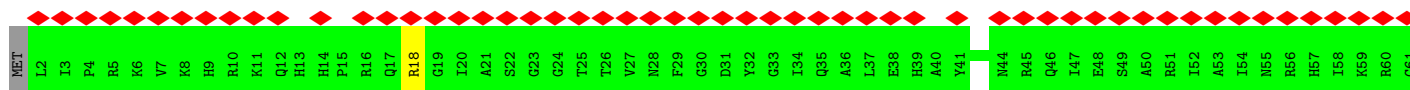
• Molecule 16: 50S ribosomal protein L14

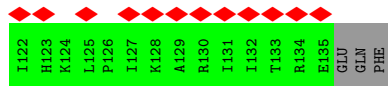
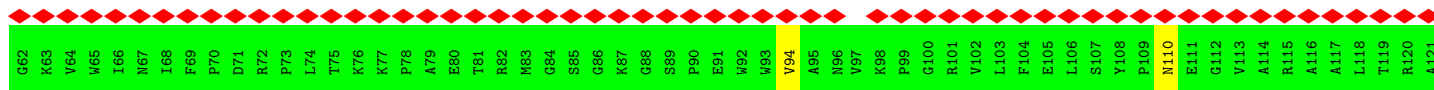


• Molecule 17: 50S ribosomal protein L15

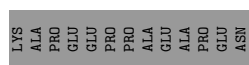
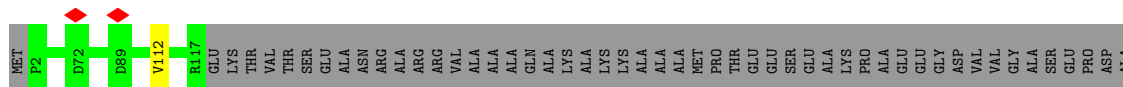


• Molecule 18: 50S ribosomal protein L16

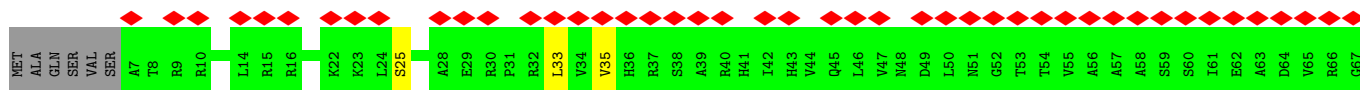
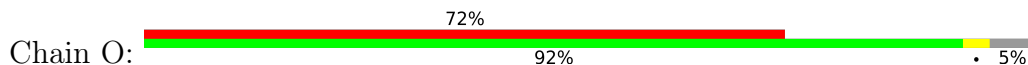




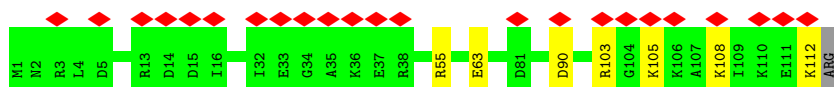
• Molecule 19: 50S ribosomal protein L17



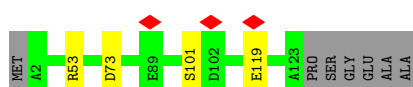
• Molecule 20: 50S ribosomal protein L18



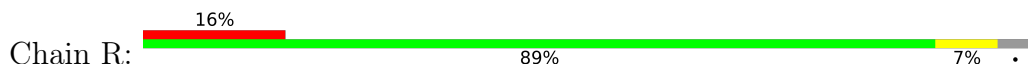
• Molecule 21: 50S ribosomal protein L19

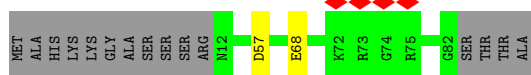
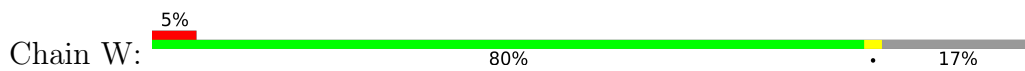


• Molecule 22: 50S ribosomal protein L20

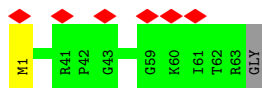


• Molecule 23: 50S ribosomal protein L21

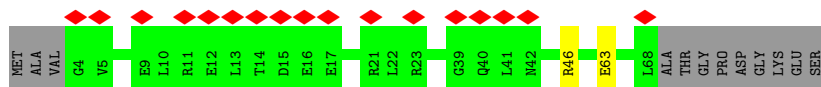
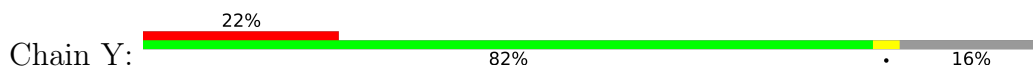




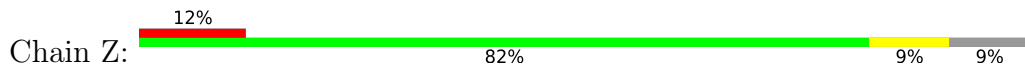
• Molecule 29: 50S ribosomal protein L28



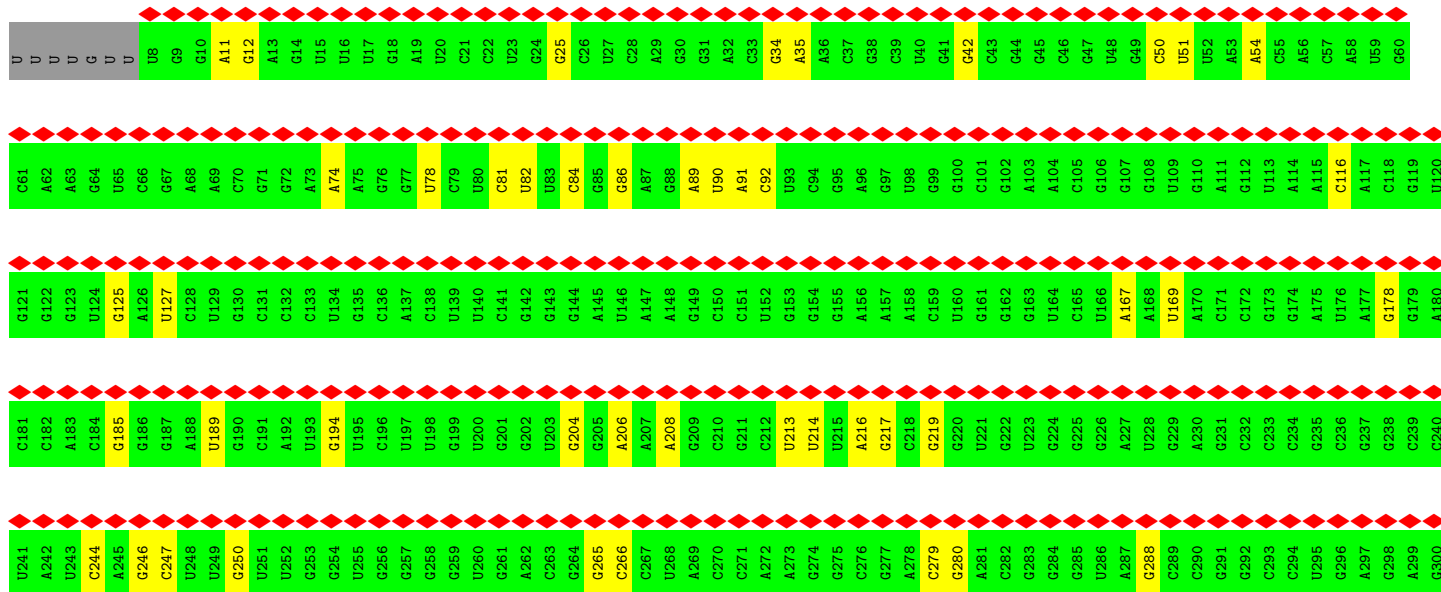
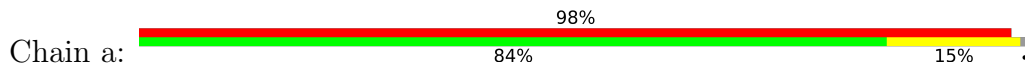
• Molecule 30: 50S ribosomal protein L29



• Molecule 31: 50S ribosomal protein L30



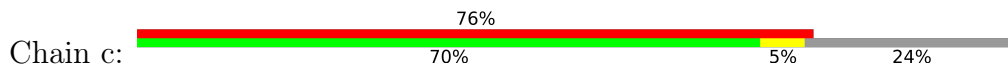
• Molecule 32: 16S rRNA



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G361	A362	A363	U364	A365	U366	U367	G368	C369	A370	C371	A372	A373	U374	G375	G376	G377	C378	G379	C380	A381	A382	G383	C384	C385	C386	G387	A388	U389	C390	C391	A392	G393	C394	G395	A396	C397	G398	C399	C400	G401	C402	G403	U404	G405	G406	G407	G408	G409	A410	U411	G412	A413	C414	G415	G416	C417	U418	U419	U420
C421	G422	G423	G424	U425	U426	G427	U428	A429	A430	A431	C432	C433	U434	C435	U436	U437	U438	C439	A440	C441	C442	A443	U444	C445	C446	A447	C448	G449	A450	A451	G452	G453	U454	C455	C456	G457	G458	G459	U460	U461	C462	U463	C464	U465	G466	G467	G468	U469	U470	U471	G472	A473	C474	G475	G476	U477	U478	G479	G480
U481	G482	G483	A484	G485	A486	A487	G488	A489	A490	G491	C492	C493	C494	C495	G496	G497	C498	C499	A500	A501	C502	U503	A504	C505	G506	U507	G508	C509	C510	A511	G512	C513	A514	G515	C516	C517	G518	C519	G520	G521	U522	A523	A524	U525	C526	C527	G528	U529	A530	G531	G532	C533	C534	G535	G536	C537	U538	G539	C540
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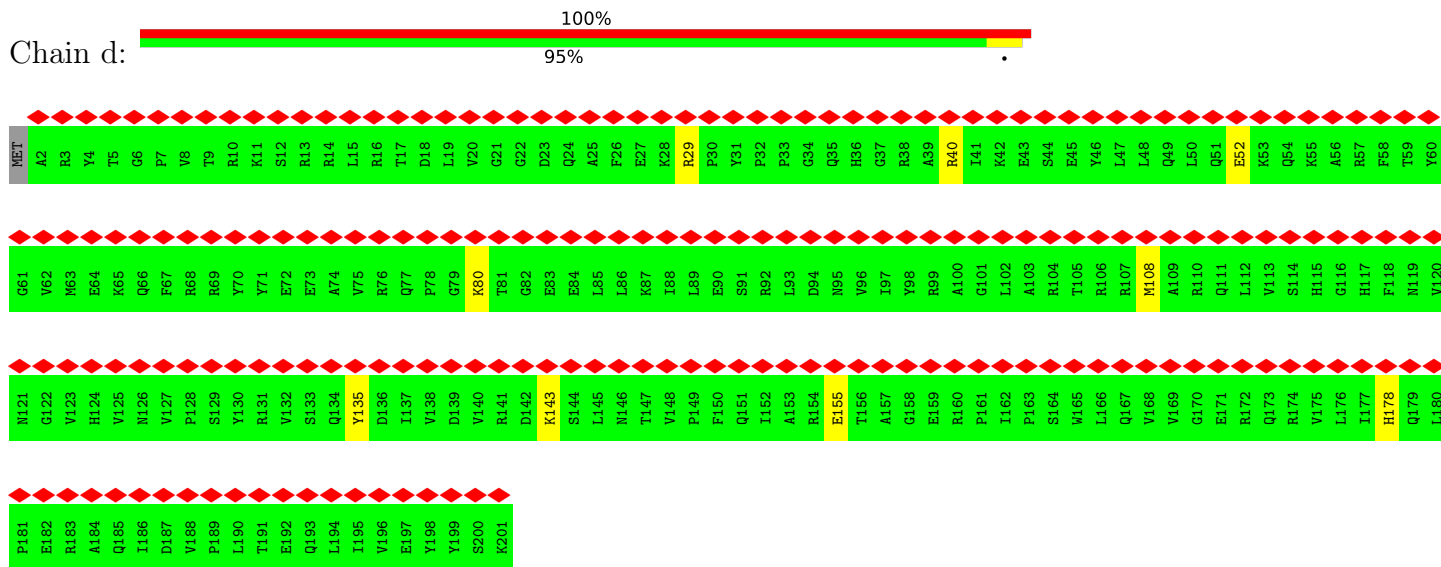
• Molecule 33: 30S ribosomal protein S3



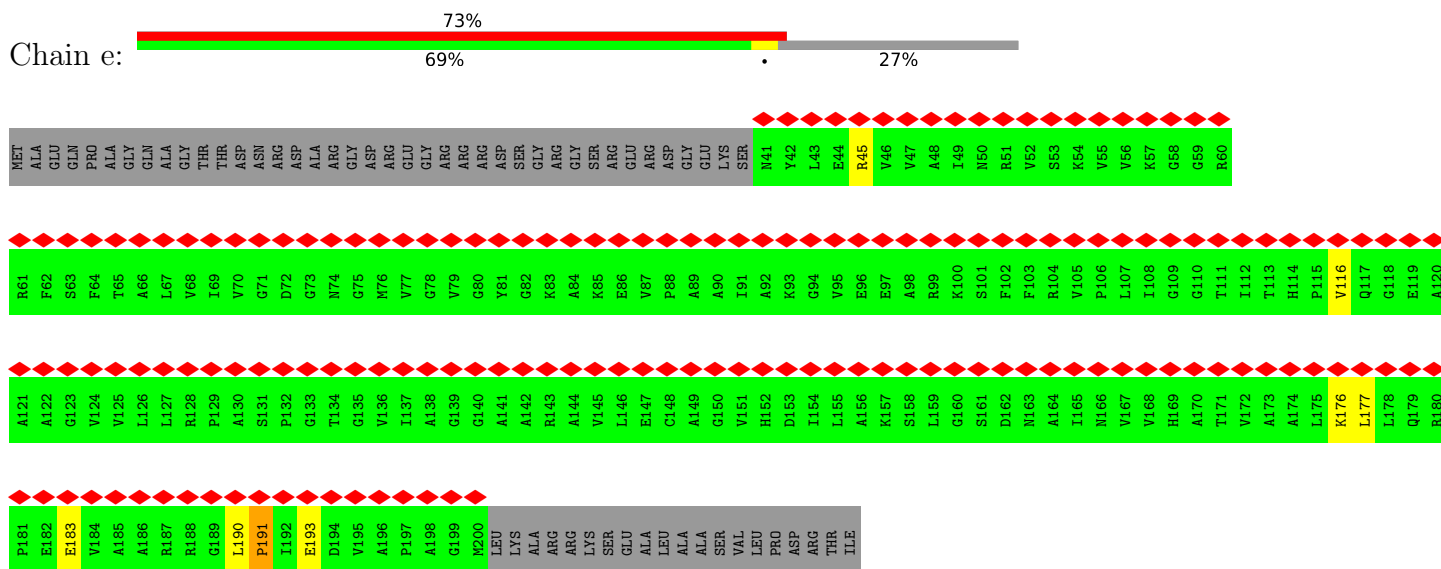
MET	G2	Q3	K4	I5	N6	P7	H8	C9	F10	R11	L12	G13	I14	T15	T16	D17	W18	K19	S20	R21	W22	Y23	A24	D25	N26	Q27	Y28	A29	E30	Y31	V32	K33	E34	D35	V36	A37	I38	R39	R40	L41	L42	S43	S44	G45	K46	M47	P48	R49	I50	I51	A52	D53	V54	E55	I56	E57	T59	R60		
D61	R62	V63	R64	D65	D66	I67	H68	T69	A70	R71	P72	G73	I74	V75	I76	G77	R78	R79	G80	T81	E82	A83	D84	R85	I86	R87	A88	D89	L90	E91	K92	L93	T94	G95	K96	Q97	V98	I99	L100	M101	I102	L103	E104	V105	K106	M107	P108	E109	G110	Q111	A112	Q113	L114	V115	A116	Q117	L118	V119	A120	
E121	Q122	L123	S124	L125	R126	V127	A128	F129	R130	R131	A132	M133	R134	K135	A136	I137	Q138	S139	A140	M141	R142	Q143	P144	G205	N145	V146	K147	G148	I149	R150	V151	Q152	C153	S154	G155	R156	L157	G158	G159	A160	E161	M162	S163	R164	S165	P166	F167	R168	R169	E170	G171	R172	V173	P174	L175	H176	T177	L178	R179	A180
D181	I182	D183	Y184	G185	L186	Y187	E188	A189	K190	T191	T192	F193	G194	R195	I196	G197	V198	K199	V200	W201	I202	Y203	K204	G205	D206	I207	V208	GLY	LYS	ARG	GLU	LEU	ALA	ALA	ALA	ALA	PRO	ALA	GLY	ALA	ASP	PRO	ARG	PRO	ARG	ARG	GLU	ARG	PRO	SER	GLY	THR	ARG	PRO	ARG	SER	ARG	GLY	ALA	

SER GLY THR THR ALA ALA THR THR GLY THR ASP ALA GLY ALA ARG ALA ALA GLY GLY GLU GLU ALA ALA ALA PRO VAL VAL ALA ALA GLN SER THR GLU SER

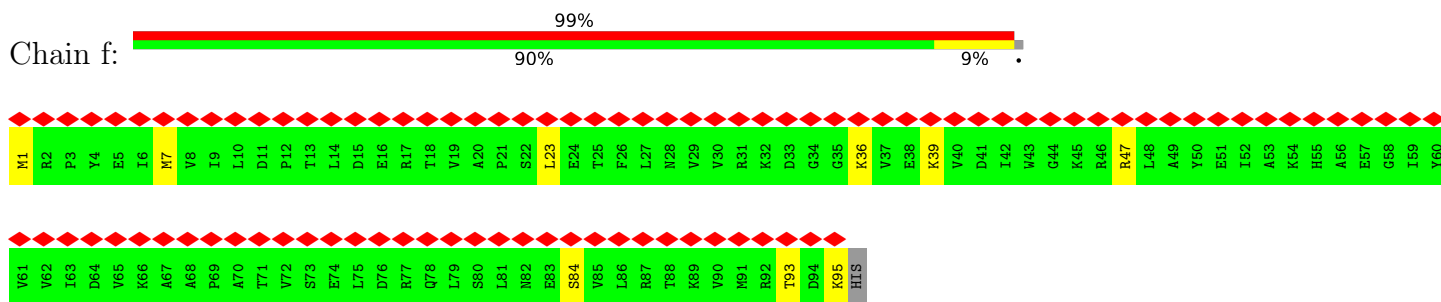
• Molecule 34: 30S ribosomal protein S4



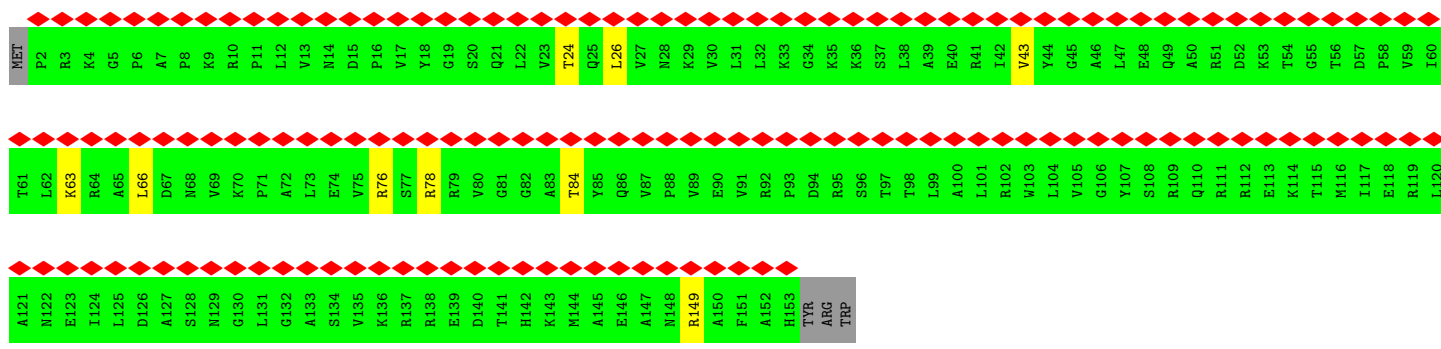
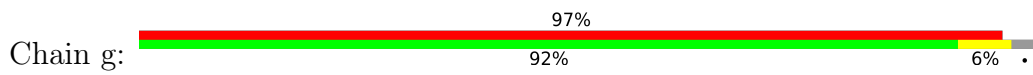
• Molecule 35: 30S ribosomal protein S5



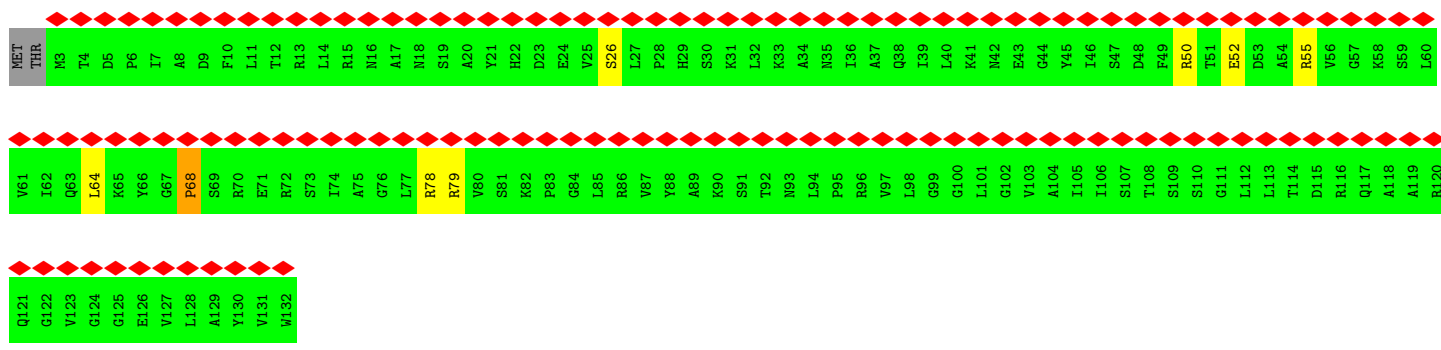
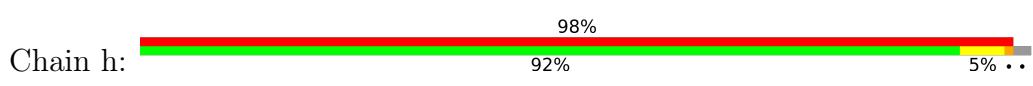
• Molecule 36: 30S ribosomal protein S6



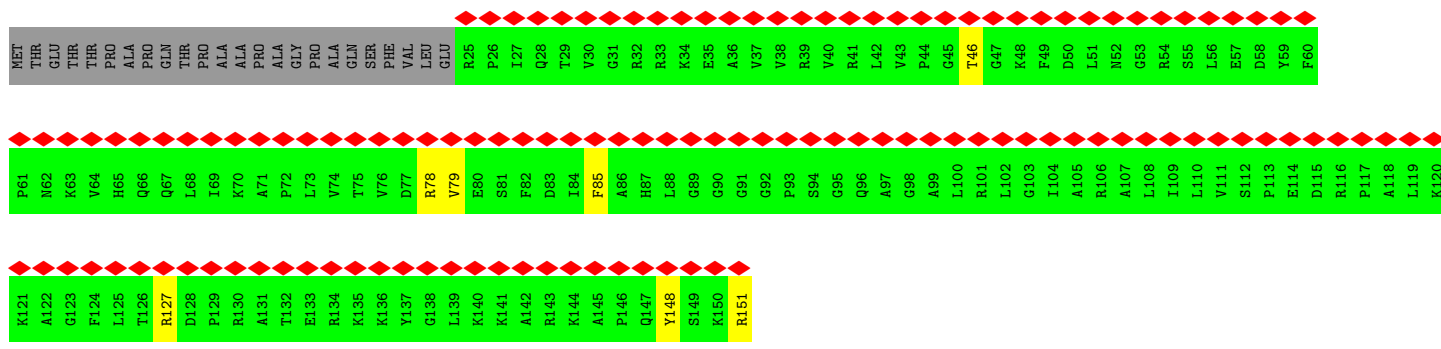
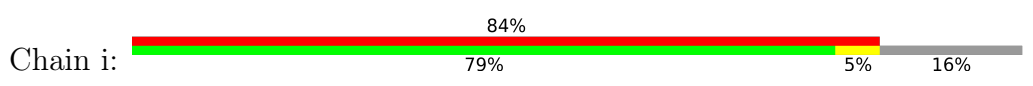
• Molecule 37: 30S ribosomal protein S7



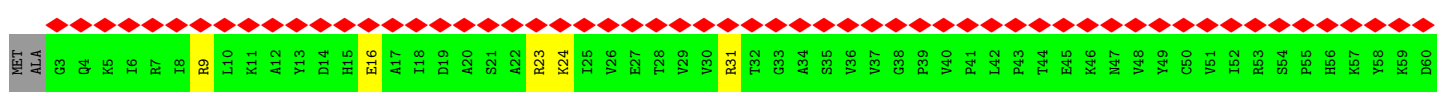
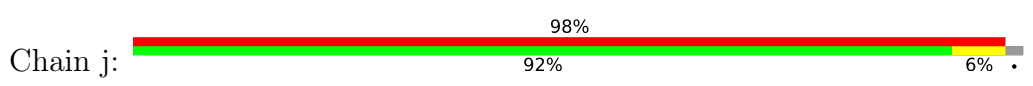
• Molecule 38: 30S ribosomal protein S8

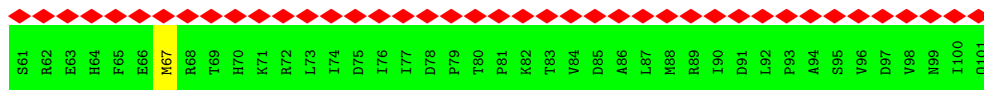


• Molecule 39: 30S ribosomal protein S9

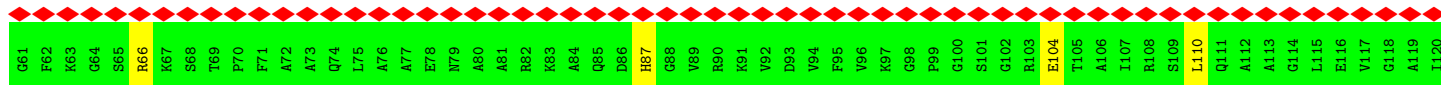
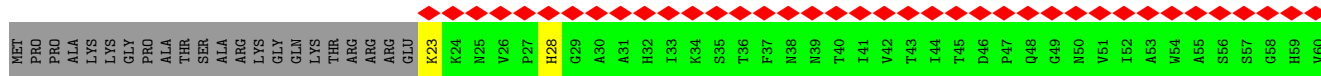
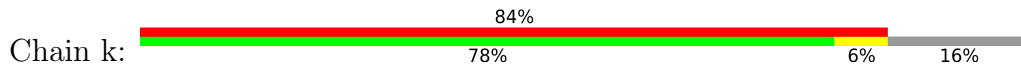


• Molecule 40: 30S ribosomal protein S10

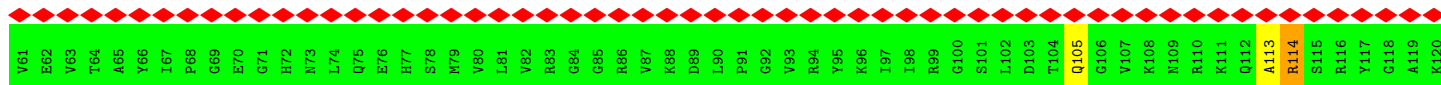
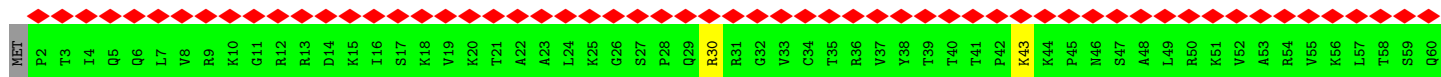
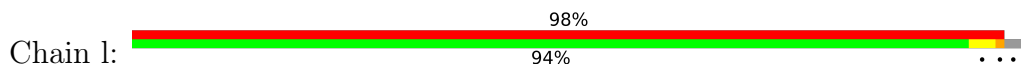




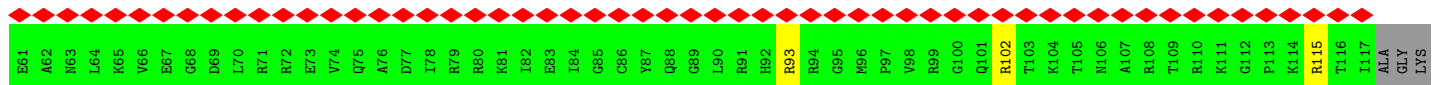
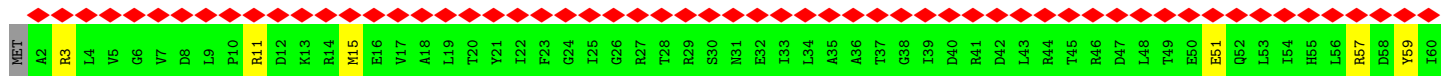
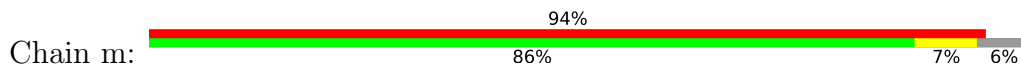
• Molecule 41: 30S ribosomal protein S11



• Molecule 42: 30S ribosomal protein S12

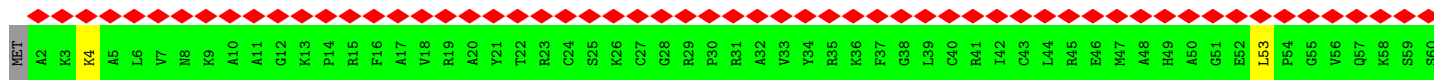


• Molecule 43: 30S ribosomal protein S13

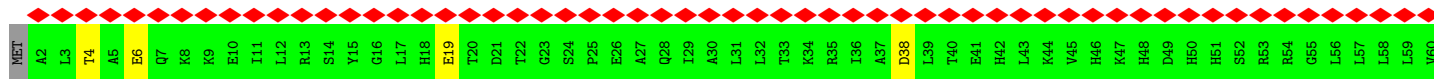
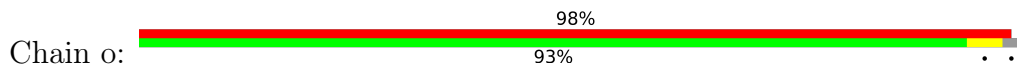


• Molecule 44: 30S ribosomal protein S14 type Z

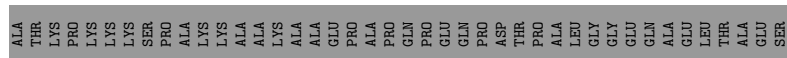
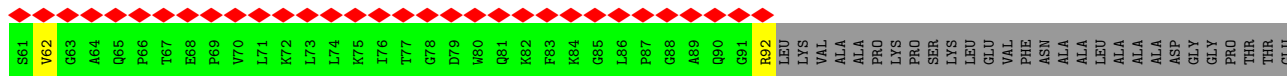
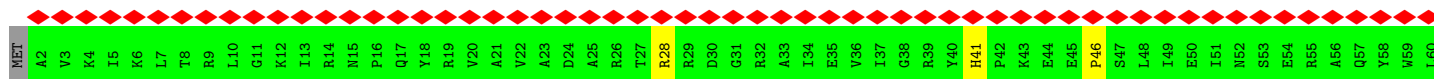




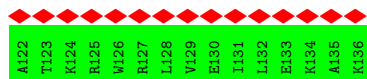
• Molecule 45: 30S ribosomal protein S15



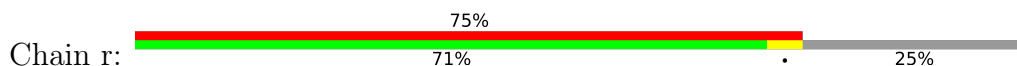
• Molecule 46: 30S ribosomal protein S16

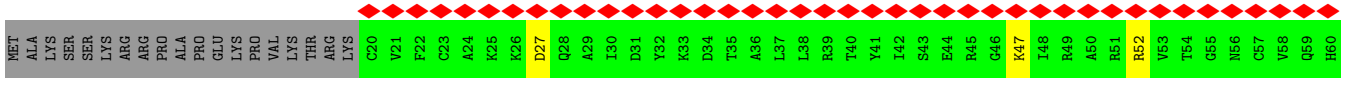


• Molecule 47: 30S ribosomal protein S17

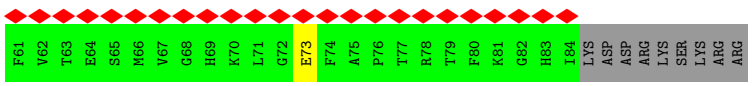
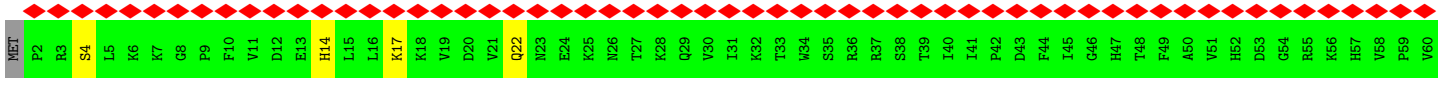
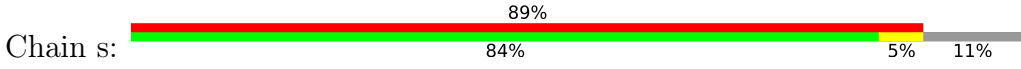


• Molecule 48: 30S ribosomal protein S18

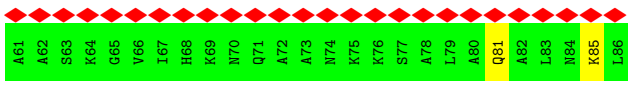
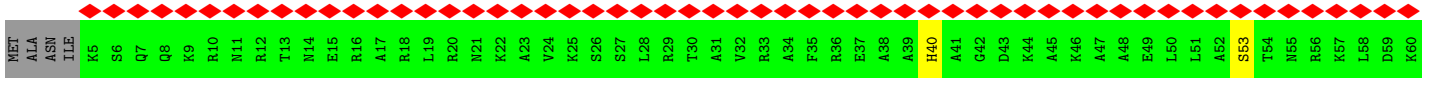
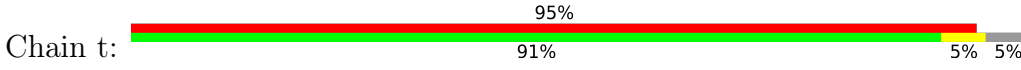




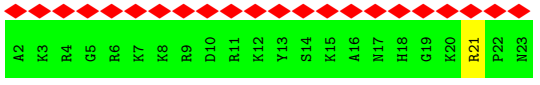
• Molecule 49: 30S ribosomal protein S19



• Molecule 50: 30S ribosomal protein S20



• Molecule 51: peptide



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	719250	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	42	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	1.618	Depositor
Minimum map value	-0.335	Depositor
Average map value	0.018	Depositor
Map value standard deviation	0.082	Depositor
Recommended contour level	0.4	Depositor
Map size (\AA)	348.6, 348.6, 348.6	wwPDB
Map dimensions	420, 420, 420	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (\AA)	0.83000004, 0.83000004, 0.83000004	Depositor

5 Model quality i

5.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section: G7M, MG, 5MU, OMG, 6MZ, 5MC, 2MG, MA6, 4OC, OMC, WDP, ZN, UR3

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	0.27	0/435	0.58	0/581
2	1	0.30	0/407	0.57	0/543
3	2	0.39	0/361	0.75	0/473
4	3	0.28	0/499	0.61	0/664
5	4	0.27	0/303	0.60	0/402
6	6	0.53	1/455 (0.2%)	0.81	3/611 (0.5%)
7	A	0.68	4/74851 (0.0%)	0.81	28/116786 (0.0%)
8	B	0.36	0/2749	0.76	0/4284
9	C	0.37	0/2129	0.59	0/2861
10	D	0.38	0/1613	0.59	0/2174
11	E	0.36	0/1575	0.59	0/2129
12	F	0.27	0/1429	0.59	0/1921
13	G	0.28	0/1351	0.57	0/1824
14	H	0.25	0/353	0.55	0/474
15	J	0.40	0/1170	0.55	0/1584
16	K	0.37	0/944	0.60	0/1268
17	L	0.33	0/1081	0.62	0/1443
18	M	0.27	0/1098	0.54	0/1481
19	N	0.38	0/925	0.54	0/1242
20	O	0.27	0/895	0.64	0/1202
21	P	0.38	0/922	0.59	0/1236
22	Q	0.41	0/992	0.63	1/1329 (0.1%)
23	R	0.39	0/766	0.59	0/1030
24	S	0.37	0/874	0.60	0/1186
25	T	0.35	0/770	0.57	0/1038
26	U	0.33	0/705	0.67	2/941 (0.2%)
27	V	0.26	0/747	0.60	0/1010
28	W	0.34	0/531	0.59	0/707
29	X	0.37	0/484	0.62	0/648
30	Y	0.32	0/544	0.59	0/727
31	Z	0.34	0/480	0.66	0/645
32	a	0.22	0/36305	0.76	6/56645 (0.0%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
33	c	0.24	0/1678	0.55	0/2254
34	d	0.24	0/1683	0.54	0/2269
35	e	0.50	2/1165 (0.2%)	0.79	4/1578 (0.3%)
36	f	0.25	0/767	0.55	0/1036
37	g	0.24	0/1210	0.58	2/1631 (0.1%)
38	h	0.28	0/1014	0.63	1/1369 (0.1%)
39	i	0.25	0/1011	0.59	0/1356
40	j	0.22	0/803	0.52	0/1086
41	k	0.26	0/891	0.55	0/1204
42	l	0.24	0/970	0.58	0/1295
43	m	0.24	0/953	0.64	0/1274
44	n	0.25	0/477	0.55	0/634
45	o	0.23	0/727	0.55	0/973
46	p	0.25	0/742	0.55	0/1000
47	q	0.25	0/766	0.62	0/1024
48	r	0.26	0/502	0.52	0/674
49	s	0.25	0/690	0.54	0/928
50	t	0.26	0/633	0.60	0/838
51	v	0.24	0/188	0.64	0/243
All	All	0.51	7/155613 (0.0%)	0.75	47/233755 (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
17	L	0	2
23	R	0	1
26	U	0	2
42	l	0	1
All	All	0	6

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	A	2296	A	C6-N6	15.53	1.46	1.33
35	e	191	PRO	CG-CD	-13.69	1.05	1.50
6	6	43	PRO	CG-CD	-8.61	1.22	1.50
7	A	2296	A	N7-C5	-7.68	1.34	1.39
7	A	2296	A	N9-C8	-6.59	1.32	1.37
35	e	191	PRO	N-CD	5.38	1.55	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	A	616	A	N9-C4	-5.31	1.34	1.37

All (47) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	A	2296	A	C2-N3-C4	18.90	120.05	110.60
35	e	191	PRO	N-CD-CG	-15.42	80.07	103.20
7	A	2296	A	N1-C2-N3	-13.61	122.50	129.30
7	A	2296	A	N3-C4-C5	-10.82	119.22	126.80
6	6	43	PRO	N-CD-CG	-10.72	87.12	103.20
35	e	191	PRO	CA-N-CD	-10.28	97.11	111.50
38	h	68	PRO	CA-N-CD	-9.24	98.56	111.50
35	e	191	PRO	CA-CB-CG	-8.46	87.93	104.00
7	A	2296	A	N3-C4-N9	8.31	134.04	127.40
7	A	2296	A	C5-N7-C8	8.23	108.02	103.90
7	A	2296	A	N7-C8-N9	-8.16	109.72	113.80
32	a	92	C	N3-C2-O2	-7.66	116.53	121.90
6	6	43	PRO	CA-N-CD	-7.45	101.07	111.50
7	A	600	G	O4'-C1'-N9	7.39	114.11	108.20
7	A	2296	A	C4-C5-N7	-6.96	107.22	110.70
7	A	2309	C	C2-N1-C1'	6.26	125.69	118.80
7	A	2296	A	C8-N9-C4	6.26	108.31	105.80
7	A	946	C	N3-C2-O2	-6.25	117.52	121.90
32	a	430	A	N1-C6-N6	-6.21	114.87	118.60
7	A	1624	C	N1-C2-O2	6.16	122.59	118.90
7	A	3060	C	N3-C2-O2	-6.08	117.64	121.90
7	A	3060	C	C2-N1-C1'	6.04	125.44	118.80
22	Q	73	ASP	CB-CG-OD2	6.01	123.71	118.30
7	A	1624	C	C2-N1-C1'	5.95	125.34	118.80
7	A	946	C	C2-N1-C1'	5.88	125.27	118.80
32	a	92	C	N1-C2-O2	5.81	122.39	118.90
7	A	976	U	C2-N1-C1'	5.76	124.62	117.70
32	a	455	C	N1-C2-O2	5.66	122.30	118.90
26	U	89	GLU	C-N-CA	5.62	135.75	121.70
7	A	2217	C	C2-N1-C1'	5.61	124.97	118.80
35	e	177	LEU	CA-CB-CG	5.61	128.19	115.30
7	A	2558	C	N1-C2-O2	5.56	122.23	118.90
7	A	882	C	N3-C2-O2	-5.51	118.04	121.90
7	A	1072	G	C4-N9-C1'	5.33	133.43	126.50
7	A	616	A	C2-N3-C4	-5.28	107.96	110.60
7	A	1272	A	O4'-C1'-N9	5.25	112.40	108.20
37	g	66	LEU	CA-CB-CG	5.24	127.36	115.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	A	3060	C	N1-C2-O2	5.24	122.04	118.90
37	g	26	LEU	CA-CB-CG	5.18	127.22	115.30
7	A	739	C	C2-N1-C1'	5.15	124.47	118.80
26	U	90	GLU	N-CA-C	5.14	124.89	111.00
32	a	517	C	O4'-C1'-N1	5.09	112.27	108.20
7	A	2309	C	N3-C2-O2	-5.08	118.34	121.90
32	a	430	A	C5-C6-N6	5.05	127.74	123.70
6	6	43	PRO	CA-CB-CG	-5.04	94.42	104.00
7	A	882	C	C2-N1-C1'	5.04	124.34	118.80
7	A	2217	C	N3-C2-O2	-5.03	118.38	121.90

There are no chirality outliers.

All (6) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
17	L	20	ARG	Peptide
17	L	28	LYS	Peptide
23	R	50	THR	Peptide
26	U	90	GLU	Peptide
26	U	91	THR	Peptide
42	l	113	ALA	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
1	0	52/57 (91%)	52 (100%)	0	0	100 100
2	1	46/55 (84%)	45 (98%)	1 (2%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	2	40/47 (85%)	39 (98%)	1 (2%)	0	100	100
4	3	60/64 (94%)	60 (100%)	0	0	100	100
5	4	35/37 (95%)	35 (100%)	0	0	100	100
6	6	53/80 (66%)	46 (87%)	7 (13%)	0	100	100
9	C	270/279 (97%)	259 (96%)	11 (4%)	0	100	100
10	D	211/213 (99%)	198 (94%)	13 (6%)	0	100	100
11	E	205/207 (99%)	201 (98%)	4 (2%)	0	100	100
12	F	176/178 (99%)	162 (92%)	14 (8%)	0	100	100
13	G	172/177 (97%)	167 (97%)	5 (3%)	0	100	100
14	H	45/152 (30%)	38 (84%)	7 (16%)	0	100	100
15	J	144/195 (74%)	141 (98%)	3 (2%)	0	100	100
16	K	119/122 (98%)	117 (98%)	2 (2%)	0	100	100
17	L	141/146 (97%)	128 (91%)	12 (8%)	1 (1%)	22	43
18	M	132/138 (96%)	122 (92%)	10 (8%)	0	100	100
19	N	114/180 (63%)	110 (96%)	4 (4%)	0	100	100
20	O	114/122 (93%)	107 (94%)	7 (6%)	0	100	100
21	P	110/113 (97%)	105 (96%)	5 (4%)	0	100	100
22	Q	120/129 (93%)	117 (98%)	3 (2%)	0	100	100
23	R	98/104 (94%)	88 (90%)	9 (9%)	1 (1%)	15	32
24	S	111/197 (56%)	108 (97%)	3 (3%)	0	100	100
25	T	96/100 (96%)	88 (92%)	8 (8%)	0	100	100
26	U	86/105 (82%)	73 (85%)	12 (14%)	1 (1%)	13	27
27	V	93/215 (43%)	90 (97%)	3 (3%)	0	100	100
28	W	69/86 (80%)	64 (93%)	5 (7%)	0	100	100
29	X	61/64 (95%)	58 (95%)	3 (5%)	0	100	100
30	Y	63/77 (82%)	60 (95%)	3 (5%)	0	100	100
31	Z	57/65 (88%)	56 (98%)	1 (2%)	0	100	100
33	c	205/274 (75%)	191 (93%)	14 (7%)	0	100	100
34	d	198/201 (98%)	188 (95%)	10 (5%)	0	100	100
35	e	158/220 (72%)	145 (92%)	12 (8%)	1 (1%)	25	47
36	f	93/96 (97%)	90 (97%)	3 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
37	g	150/156 (96%)	146 (97%)	4 (3%)	0	100	100
38	h	128/132 (97%)	123 (96%)	4 (3%)	1 (1%)	19	39
39	i	125/151 (83%)	107 (86%)	18 (14%)	0	100	100
40	j	97/101 (96%)	86 (89%)	11 (11%)	0	100	100
41	k	115/139 (83%)	108 (94%)	7 (6%)	0	100	100
42	l	120/124 (97%)	95 (79%)	24 (20%)	1 (1%)	19	39
43	m	114/124 (92%)	105 (92%)	9 (8%)	0	100	100
44	n	58/61 (95%)	55 (95%)	3 (5%)	0	100	100
45	o	85/89 (96%)	79 (93%)	5 (6%)	1 (1%)	13	27
46	p	89/162 (55%)	81 (91%)	7 (8%)	1 (1%)	14	30
47	q	91/135 (67%)	82 (90%)	9 (10%)	0	100	100
48	r	61/84 (73%)	58 (95%)	3 (5%)	0	100	100
49	s	81/93 (87%)	70 (86%)	11 (14%)	0	100	100
50	t	80/86 (93%)	80 (100%)	0	0	100	100
51	v	20/22 (91%)	20 (100%)	0	0	100	100
All	All	5161/6154 (84%)	4843 (94%)	310 (6%)	8 (0%)	50	71

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
23	R	51	THR
42	l	114	ARG
17	L	5	LEU
45	o	19	GLU
26	U	91	THR
46	p	46	PRO
35	e	191	PRO
38	h	68	PRO

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	44/47 (94%)	41 (93%)	3 (7%)	16	32
2	1	45/51 (88%)	42 (93%)	3 (7%)	16	33
3	2	36/40 (90%)	34 (94%)	2 (6%)	21	42
4	3	53/54 (98%)	51 (96%)	2 (4%)	33	59
5	4	35/35 (100%)	34 (97%)	1 (3%)	42	68
6	6	49/66 (74%)	44 (90%)	5 (10%)	7	14
9	C	212/218 (97%)	205 (97%)	7 (3%)	38	64
10	D	163/163 (100%)	153 (94%)	10 (6%)	18	38
11	E	159/159 (100%)	153 (96%)	6 (4%)	33	59
12	F	147/147 (100%)	134 (91%)	13 (9%)	10	19
13	G	143/145 (99%)	137 (96%)	6 (4%)	30	55
14	H	36/121 (30%)	28 (78%)	8 (22%)	1	1
15	J	120/161 (74%)	115 (96%)	5 (4%)	30	55
16	K	100/101 (99%)	96 (96%)	4 (4%)	31	57
17	L	107/110 (97%)	100 (94%)	7 (6%)	17	34
18	M	110/114 (96%)	107 (97%)	3 (3%)	44	71
19	N	94/139 (68%)	93 (99%)	1 (1%)	73	88
20	O	88/93 (95%)	84 (96%)	4 (4%)	27	52
21	P	98/99 (99%)	91 (93%)	7 (7%)	14	29
22	Q	95/99 (96%)	92 (97%)	3 (3%)	39	65
23	R	81/83 (98%)	76 (94%)	5 (6%)	18	37
24	S	87/140 (62%)	84 (97%)	3 (3%)	37	63
25	T	82/83 (99%)	76 (93%)	6 (7%)	14	28
26	U	77/88 (88%)	69 (90%)	8 (10%)	7	13
27	V	75/164 (46%)	68 (91%)	7 (9%)	9	17
28	W	51/62 (82%)	49 (96%)	2 (4%)	32	58
29	X	52/52 (100%)	51 (98%)	1 (2%)	57	79
30	Y	58/66 (88%)	56 (97%)	2 (3%)	37	63
31	Z	51/55 (93%)	45 (88%)	6 (12%)	5	9
33	c	170/210 (81%)	155 (91%)	15 (9%)	10	19
34	d	176/177 (99%)	167 (95%)	9 (5%)	24	46
35	e	114/159 (72%)	108 (95%)	6 (5%)	22	45

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
36	f	84/85 (99%)	75 (89%)	9 (11%)	6	12
37	g	127/131 (97%)	120 (94%)	7 (6%)	21	43
38	h	106/108 (98%)	99 (93%)	7 (7%)	16	33
39	i	102/120 (85%)	95 (93%)	7 (7%)	15	31
40	j	89/90 (99%)	83 (93%)	6 (7%)	16	33
41	k	90/107 (84%)	82 (91%)	8 (9%)	9	19
42	l	104/105 (99%)	100 (96%)	4 (4%)	33	59
43	m	99/104 (95%)	90 (91%)	9 (9%)	9	18
44	n	46/47 (98%)	44 (96%)	2 (4%)	29	54
45	o	77/79 (98%)	74 (96%)	3 (4%)	32	58
46	p	75/125 (60%)	71 (95%)	4 (5%)	22	45
47	q	83/105 (79%)	76 (92%)	7 (8%)	11	21
48	r	53/72 (74%)	50 (94%)	3 (6%)	20	41
49	s	75/85 (88%)	70 (93%)	5 (7%)	16	33
50	t	62/65 (95%)	58 (94%)	4 (6%)	17	34
51	v	18/18 (100%)	17 (94%)	1 (6%)	21	42
All	All	4298/4947 (87%)	4042 (94%)	256 (6%)	23	39

All (256) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	0	6	ARG
1	0	25	THR
1	0	38	LYS
2	1	25	THR
2	1	30	ARG
2	1	37	GLU
3	2	32	SER
3	2	44	THR
4	3	30	ARG
4	3	31	HIS
5	4	22	ARG
6	6	1	MET
6	6	2	LYS
6	6	9	TYR
6	6	29	PRO

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Mol	Chain	Res	Type
6	6	63	LYS
9	C	25	THR
9	C	27	SER
9	C	40	ARG
9	C	96	HIS
9	C	99	ASP
9	C	124	ASP
9	C	273	ARG
10	D	19	GLU
10	D	43	GLU
10	D	45	ASP
10	D	51	GLN
10	D	56	GLU
10	D	113	ASP
10	D	115	THR
10	D	135	GLN
10	D	185	VAL
10	D	212	ILE
11	E	10	LYS
11	E	19	LYS
11	E	69	ARG
11	E	73	ARG
11	E	74	GLN
11	E	81	ARG
12	F	10	ARG
12	F	18	GLU
12	F	21	ASP
12	F	33	MET
12	F	52	ARG
12	F	76	ARG
12	F	90	MET
12	F	103	MET
12	F	134	ASN
12	F	141	GLU
12	F	152	LYS
12	F	159	MET
12	F	166	SER
13	G	46	ASN
13	G	55	ARG
13	G	60	ARG
13	G	61	ARG
13	G	102	SER

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Mol	Chain	Res	Type
13	G	133	THR
14	H	1	MET
14	H	2	LYS
14	H	3	LEU
14	H	5	LEU
14	H	10	ASP
14	H	20	GLU
14	H	33	ARG
14	H	45	LYS
15	J	3	THR
15	J	11	THR
15	J	22	ASP
15	J	133	SER
15	J	143	LYS
16	K	23	ARG
16	K	69	ARG
16	K	97	ARG
16	K	113	LYS
17	L	21	VAL
17	L	72	THR
17	L	95	ASP
17	L	116	LYS
17	L	122	ASP
17	L	126	HIS
17	L	144	THR
18	M	18	ARG
18	M	94	VAL
18	M	110	ASN
19	N	112	VAL
20	O	25	SER
20	O	33	LEU
20	O	35	VAL
20	O	103	THR
21	P	55	ARG
21	P	63	GLU
21	P	90	ASP
21	P	103	ARG
21	P	105	LYS
21	P	108	LYS
21	P	112	LYS
22	Q	53	ARG
22	Q	101	SER

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Mol	Chain	Res	Type
22	Q	119	GLU
23	R	23	VAL
23	R	32	GLN
23	R	37	SER
23	R	58	LYS
23	R	92	ARG
24	S	69	GLN
24	S	119	SER
24	S	120	ARG
25	T	3	THR
25	T	4	LEU
25	T	26	ASP
25	T	68	ARG
25	T	70	ARG
25	T	85	THR
26	U	22	LYS
26	U	40	ARG
26	U	45	THR
26	U	63	GLU
26	U	69	SER
26	U	72	MET
26	U	98	SER
26	U	103	LYS
27	V	10	ARG
27	V	51	ASP
27	V	61	THR
27	V	68	ASP
27	V	69	ILE
27	V	98	VAL
27	V	99	ARG
28	W	57	ASP
28	W	68	GLU
29	X	1	MET
30	Y	46	ARG
30	Y	63	GLU
31	Z	22	SER
31	Z	40	ASN
31	Z	44	ARG
31	Z	55	GLU
31	Z	56	VAL
31	Z	57	GLU
33	c	21	ARG

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Mol	Chain	Res	Type
33	c	40	ARG
33	c	48	ARG
33	c	60	ARG
33	c	61	ASP
33	c	71	ARG
33	c	85	ARG
33	c	92	LYS
33	c	104	GLU
33	c	117	GLN
33	c	130	ARG
33	c	141	MET
33	c	162	MET
33	c	179	ARG
33	c	195	ARG
34	d	29	ARG
34	d	40	ARG
34	d	52	GLU
34	d	80	LYS
34	d	108	MET
34	d	135	TYR
34	d	143	LYS
34	d	155	GLU
34	d	178	HIS
35	e	45	ARG
35	e	116	VAL
35	e	176	LYS
35	e	183	GLU
35	e	190	LEU
35	e	193	GLU
36	f	1	MET
36	f	7	MET
36	f	23	LEU
36	f	36	LYS
36	f	39	LYS
36	f	47	ARG
36	f	84	SER
36	f	93	THR
36	f	95	LYS
37	g	24	THR
37	g	43	VAL
37	g	63	LYS
37	g	76	ARG

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Mol	Chain	Res	Type
37	g	78	ARG
37	g	84	THR
37	g	149	ARG
38	h	26	SER
38	h	50	ARG
38	h	52	GLU
38	h	55	ARG
38	h	64	LEU
38	h	78	ARG
38	h	79	ARG
39	i	46	THR
39	i	78	ARG
39	i	79	VAL
39	i	85	PHE
39	i	127	ARG
39	i	148	TYR
39	i	151	ARG
40	j	9	ARG
40	j	16	GLU
40	j	23	ARG
40	j	24	LYS
40	j	31	ARG
40	j	67	MET
41	k	23	LYS
41	k	28	HIS
41	k	66	ARG
41	k	87	HIS
41	k	104	GLU
41	k	110	LEU
41	k	126	GLN
41	k	129	ASN
42	l	30	ARG
42	l	43	LYS
42	l	105	GLN
42	l	114	ARG
43	m	3	ARG
43	m	11	ARG
43	m	15	MET
43	m	51	GLU
43	m	57	ARG
43	m	59	TYR
43	m	93	ARG

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Mol	Chain	Res	Type
43	m	102	ARG
43	m	115	ARG
44	n	4	LYS
44	n	53	LEU
45	o	4	THR
45	o	6	GLU
45	o	38	ASP
46	p	28	ARG
46	p	41	HIS
46	p	62	VAL
46	p	92	ARG
47	q	70	MET
47	q	82	MET
47	q	92	ARG
47	q	93	THR
47	q	105	VAL
47	q	115	MET
47	q	116	GLU
48	r	27	ASP
48	r	47	LYS
48	r	52	ARG
49	s	4	SER
49	s	14	HIS
49	s	17	LYS
49	s	22	GLN
49	s	73	GLU
50	t	40	HIS
50	t	53	SER
50	t	81	GLN
50	t	85	LYS
51	v	21	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	0	37	HIS
11	E	127	ASN
12	F	62	ASN
18	M	110	ASN
27	V	38	HIS
27	V	74	GLN
27	V	91	GLN

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Mol	Chain	Res	Type
34	d	24	GLN
34	d	167	GLN
43	m	55	HIS

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
32	a	1515/1537 (98%)	224 (14%)	0
7	A	3115/3138 (99%)	423 (13%)	2 (0%)
8	B	114/115 (99%)	16 (14%)	0
All	All	4744/4790 (99%)	663 (13%)	2 (0%)

All (663) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
7	A	13	A
7	A	35	G
7	A	63	A
7	A	71	A
7	A	74	U
7	A	75	G
7	A	94	C
7	A	118	A
7	A	119	A
7	A	120	U
7	A	125	A
7	A	142	U
7	A	143	G
7	A	167	A
7	A	176	G
7	A	183	A
7	A	198	A
7	A	201	A
7	A	217	G
7	A	218	A
7	A	224	A
7	A	225	A
7	A	231	U
7	A	232	G
7	A	250	G
7	A	269	G

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Mol	Chain	Res	Type
7	A	271	U
7	A	279	A
7	A	283	A
7	A	286	G
7	A	287	G
7	A	288	U
7	A	289	A
7	A	290	A
7	A	293	G
7	A	294	G
7	A	297	A
7	A	301	G
7	A	303	U
7	A	320	G
7	A	327	U
7	A	328	A
7	A	329	U
7	A	330	G
7	A	331	U
7	A	332	C
7	A	339	C
7	A	345	G
7	A	358	U
7	A	370	G
7	A	372	G
7	A	377	G
7	A	394	U
7	A	399	U
7	A	413	A
7	A	414	G
7	A	429	A
7	A	446	A
7	A	447	G
7	A	448	U
7	A	453	A
7	A	473	C
7	A	475	G
7	A	500	G
7	A	501	A
7	A	526	U
7	A	544	U
7	A	570	G

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Mol	Chain	Res	Type
7	A	592	G
7	A	593	A
7	A	595	U
7	A	596	A
7	A	597	C
7	A	606	G
7	A	616	A
7	A	618	U
7	A	619	C
7	A	620	C
7	A	621	G
7	A	637	C
7	A	639	U
7	A	641	U
7	A	642	C
7	A	643	C
7	A	645	G
7	A	653	U
7	A	665	G
7	A	673	A
7	A	675	G
7	A	676	A
7	A	677	A
7	A	689	G
7	A	694	G
7	A	706	A
7	A	719	U
7	A	741	A
7	A	750	A
7	A	756	A
7	A	758	C
7	A	759	C
7	A	760	A
7	A	768	A
7	A	772	G
7	A	774	G
7	A	776	G
7	A	779	U
7	A	780	G
7	A	781	A
7	A	782	A
7	A	783	U

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Mol	Chain	Res	Type
7	A	815	U
7	A	843	U
7	A	844	A
7	A	846	G
7	A	847	A
7	A	852	G
7	A	859	C
7	A	876	U
7	A	893	A
7	A	894	G
7	A	904	G
7	A	905	G
7	A	911	A
7	A	913	G
7	A	914	G
7	A	918	A
7	A	934	G
7	A	941	C
7	A	956	U
7	A	958	A
7	A	988	G
7	A	1007	G
7	A	1025	A
7	A	1026	C
7	A	1036	C
7	A	1039	A
7	A	1043	C
7	A	1059	A
7	A	1061	A
7	A	1074	G
7	A	1086	U
7	A	1087	A
7	A	1089	G
7	A	1096	A
7	A	1103	A
7	A	1112	A
7	A	1125	G
7	A	1142	G
7	A	1155	G
7	A	1162	U
7	A	1168	G
7	A	1175	A

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Mol	Chain	Res	Type
7	A	1176	G
7	A	1177	A
7	A	1184	G
7	A	1189	U
7	A	1190	U
7	A	1191	G
7	A	1193	C
7	A	1196	A
7	A	1199	A
7	A	1200	G
7	A	1202	A
7	A	1207	C
7	A	1208	C
7	A	1210	U
7	A	1212	G
7	A	1215	A
7	A	1216	G
7	A	1217	A
7	A	1219	U
7	A	1230	U
7	A	1234	U
7	A	1239	A
7	A	1240	A
7	A	1241	G
7	A	1261	U
7	A	1262	A
7	A	1264	C
7	A	1265	G
7	A	1271	C
7	A	1273	A
7	A	1304	U
7	A	1305	U
7	A	1306	G
7	A	1308	G
7	A	1309	G
7	A	1342	C
7	A	1381	G
7	A	1384	A
7	A	1387	G
7	A	1402	G
7	A	1403	A
7	A	1406	A

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Mol	Chain	Res	Type
7	A	1431	A
7	A	1432	A
7	A	1451	C
7	A	1452	C
7	A	1453	A
7	A	1460	U
7	A	1481	C
7	A	1483	U
7	A	1491	G
7	A	1496	A
7	A	1499	G
7	A	1510	U
7	A	1515	A
7	A	1542	G
7	A	1551	C
7	A	1552	G
7	A	1554	G
7	A	1560	U
7	A	1561	C
7	A	1562	A
7	A	1567	U
7	A	1568	A
7	A	1577	C
7	A	1580	A
7	A	1581	A
7	A	1582	A
7	A	1609	U
7	A	1610	G
7	A	1614	A
7	A	1615	G
7	A	1622	G
7	A	1624	C
7	A	1625	U
7	A	1636	U
7	A	1637	U
7	A	1646	G
7	A	1647	U
7	A	1657	A
7	A	1658	A
7	A	1666	C
7	A	1690	A
7	A	1693	G

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Mol	Chain	Res	Type
7	A	1696	A
7	A	1697	A
7	A	1698	C
7	A	1699	A
7	A	1720	G
7	A	1722	G
7	A	1727	A
7	A	1746	U
7	A	1754	A
7	A	1763	G
7	A	1773	U
7	A	1774	U
7	A	1797	G
7	A	1803	A
7	A	1806	A
7	A	1821	G
7	A	1832	G
7	A	1842	C
7	A	1843	A
7	A	1845	A
7	A	1881	U
7	A	1883	C
7	A	1884	G
7	A	1888	U
7	A	1889	A
7	A	1909	G
7	A	1950	A
7	A	1959	A
7	A	1960	C
7	A	1961	C
7	A	1963	U
7	A	1964	U
7	A	1990	G
7	A	1992	A
7	A	1998	U
7	A	2007	A
7	A	2010	G
7	A	2034	C
7	A	2035	G
7	A	2050	U
7	A	2063	A
7	A	2105	G

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Mol	Chain	Res	Type
7	A	2106	C
7	A	2107	A
7	A	2108	A
7	A	2109	G
7	A	2124	U
7	A	2144	G
7	A	2151	A
7	A	2157	A
7	A	2167	G
7	A	2168	G
7	A	2175	A
7	A	2176	A
7	A	2193	U
7	A	2203	C
7	A	2205	C
7	A	2208	A
7	A	2209	U
7	A	2210	G
7	A	2229	U
7	A	2231	U
7	A	2258	A
7	A	2259	C
7	A	2261	A
7	A	2270	G
7	A	2281	C
7	A	2293	C
7	A	2294	G
7	A	2297	A
7	A	2298	A
7	A	2299	G
7	A	2300	A
7	A	2330	G
7	A	2340	A
7	A	2343	G
7	A	2346	U
7	A	2347	G
7	A	2348	U
7	A	2352	G
7	A	2353	G
7	A	2354	A
7	A	2355	U
7	A	2356	A

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Mol	Chain	Res	Type
7	A	2357	G
7	A	2360	G
7	A	2361	G
7	A	2362	G
7	A	2364	G
7	A	2365	A
7	A	2366	C
7	A	2367	U
7	A	2371	A
7	A	2375	C
7	A	2377	C
7	A	2378	G
7	A	2382	C
7	A	2384	A
7	A	2385	G
7	A	2387	U
7	A	2391	G
7	A	2393	G
7	A	2394	G
7	A	2395	A
7	A	2396	G
7	A	2398	C
7	A	2400	U
7	A	2401	U
7	A	2402	G
7	A	2403	U
7	A	2404	U
7	A	2405	G
7	A	2406	A
7	A	2407	A
7	A	2408	A
7	A	2412	C
7	A	2413	A
7	A	2416	C
7	A	2417	U
7	A	2419	A
7	A	2424	A
7	A	2435	A
7	A	2449	A
7	A	2463	A
7	A	2476	G
7	A	2477	G

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Mol	Chain	Res	Type
7	A	2489	OMG
7	A	2517	G
7	A	2521	C
7	A	2525	A
7	A	2526	A
7	A	2543	A
7	A	2546	G
7	A	2547	C
7	A	2550	U
7	A	2558	C
7	A	2560	A
7	A	2563	G
7	A	2573	A
7	A	2583	G
7	A	2585	C
7	A	2588	C
7	A	2615	A
7	A	2621	G
7	A	2623	A
7	A	2644	A
7	A	2661	U
7	A	2663	A
7	A	2667	G
7	A	2668	A
7	A	2679	C
7	A	2686	A
7	A	2707	A
7	A	2714	A
7	A	2728	G
7	A	2736	OMC
7	A	2743	G
7	A	2751	G
7	A	2756	A
7	A	2767	G
7	A	2773	G
7	A	2804	A
7	A	2805	G
7	A	2840	A
7	A	2847	U
7	A	2851	U
7	A	2868	A
7	A	2952	G

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Mol	Chain	Res	Type
7	A	2962	C
7	A	2964	C
7	A	2986	A
7	A	2995	A
7	A	2996	A
7	A	3003	A
7	A	3016	A
7	A	3018	C
7	A	3023	U
7	A	3037	G
7	A	3038	U
7	A	3040	G
7	A	3056	A
7	A	3070	A
7	A	3107	A
7	A	3118	A
7	A	3119	C
7	A	3120	C
7	A	3129	A
8	B	2	U
8	B	8	G
8	B	24	A
8	B	34	U
8	B	41	C
8	B	51	A
8	B	55	U
8	B	56	A
8	B	65	A
8	B	85	U
8	B	86	C
8	B	88	G
8	B	101	G
8	B	105	A
8	B	114	C
8	B	115	A
32	a	11	A
32	a	12	G
32	a	25	G
32	a	34	G
32	a	35	A
32	a	42	G
32	a	50	C

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Mol	Chain	Res	Type
32	a	51	U
32	a	54	A
32	a	74	A
32	a	78	U
32	a	81	C
32	a	82	U
32	a	84	C
32	a	86	G
32	a	89	A
32	a	90	U
32	a	91	A
32	a	116	C
32	a	125	G
32	a	127	U
32	a	167	A
32	a	169	U
32	a	178	G
32	a	185	G
32	a	189	U
32	a	194	G
32	a	204	G
32	a	206	A
32	a	208	A
32	a	213	U
32	a	214	U
32	a	216	A
32	a	217	G
32	a	219	G
32	a	244	C
32	a	246	G
32	a	247	C
32	a	250	G
32	a	265	G
32	a	266	C
32	a	279	C
32	a	280	G
32	a	288	G
32	a	327	U
32	a	328	A
32	a	346	G
32	a	350	G
32	a	351	C

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Mol	Chain	Res	Type
32	a	353	G
32	a	366	U
32	a	368	G
32	a	371	C
32	a	381	A
32	a	391	C
32	a	397	C
32	a	405	G
32	a	408	G
32	a	409	G
32	a	410	A
32	a	411	U
32	a	412	G
32	a	413	A
32	a	414	C
32	a	420	U
32	a	421	C
32	a	428	U
32	a	437	U
32	a	439	C
32	a	451	A
32	a	452	G
32	a	453	G
32	a	455	C
32	a	457	G
32	a	459	G
32	a	460	U
32	a	461	U
32	a	463	U
32	a	465	U
32	a	473	A
32	a	476	G
32	a	485	G
32	a	486	A
32	a	487	A
32	a	488	G
32	a	490	A
32	a	500	A
32	a	501	A
32	a	502	C
32	a	508	G
32	a	509	C

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Mol	Chain	Res	Type
32	a	512	G
32	a	517	C
32	a	518	G7M
32	a	523	A
32	a	538	A
32	a	550	A
32	a	551	A
32	a	553	U
32	a	563	A
32	a	564	A
32	a	565	A
32	a	566	G
32	a	567	A
32	a	568	G
32	a	606	C
32	a	610	U
32	a	623	U
32	a	624	G
32	a	633	A
32	a	640	G
32	a	644	A
32	a	656	G
32	a	677	U
32	a	678	A
32	a	686	A
32	a	694	G
32	a	709	A
32	a	712	G
32	a	740	A
32	a	746	G
32	a	768	A
32	a	784	U
32	a	785	A
32	a	806	A
32	a	808	C
32	a	827	G
32	a	830	U
32	a	833	U
32	a	835	C
32	a	836	C
32	a	837	U
32	a	838	U

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Mol	Chain	Res	Type
32	a	865	A
32	a	866	A
32	a	883	G
32	a	895	G
32	a	900	A
32	a	919	G
32	a	927	C
32	a	951	A
32	a	953	U
32	a	954	U
32	a	962	A
32	a	968	A
32	a	969	G
32	a	970	A
32	a	985	U
32	a	986	G
32	a	987	A
32	a	993	A
32	a	997	G
32	a	1008	A
32	a	1010	A
32	a	1012	A
32	a	1019	C
32	a	1020	C
32	a	1021	C
32	a	1022	U
32	a	1023	U
32	a	1024	G
32	a	1033	G
32	a	1035	G
32	a	1044	G
32	a	1056	U
32	a	1085	G
32	a	1086	U
32	a	1092	A
32	a	1099	G
32	a	1116	U
32	a	1126	G
32	a	1129	A
32	a	1131	G
32	a	1137	G
32	a	1138	A

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Mol	Chain	Res	Type
32	a	1150	C
32	a	1151	U
32	a	1160	C
32	a	1161	A
32	a	1174	G
32	a	1175	U
32	a	1176	G
32	a	1188	A
32	a	1189	A
32	a	1199	C
32	a	1204	U
32	a	1205	A
32	a	1206	U
32	a	1218	C
32	a	1219	A
32	a	1228	A
32	a	1230	A
32	a	1232	U
32	a	1233	G
32	a	1249	U
32	a	1250	G
32	a	1252	G
32	a	1254	U
32	a	1270	G
32	a	1272	A
32	a	1277	U
32	a	1279	A
32	a	1292	G
32	a	1297	G
32	a	1312	C
32	a	1314	C
32	a	1328	C
32	a	1349	A
32	a	1356	A
32	a	1357	C
32	a	1369	U
32	a	1371	C
32	a	1419	A
32	a	1435	G
32	a	1439	A
32	a	1444	U
32	a	1485	A

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Mol	Chain	Res	Type
32	a	1486	A
32	a	1492	A
32	a	1496	A
32	a	1510	G
32	a	1513	G
32	a	1522	G
32	a	1523	G

All (2) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
7	A	338	G
7	A	913	G

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

13 non-standard protein/DNA/RNA residues are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
32	MA6	a	1511	32	19,26,27	0.79	0	18,38,41	1.51	2 (11%)
32	2MG	a	1509	32	18,26,27	2.96	4 (22%)	16,38,41	1.17	2 (12%)
32	G7M	a	518	32	20,26,27	2.58	4 (20%)	17,39,42	0.82	1 (5%)
7	OMG	A	2489	7	18,26,27	2.67	5 (27%)	19,38,41	1.46	4 (21%)
7	OMC	A	2736	54,7	19,22,23	1.62	2 (10%)	26,31,34	1.05	1 (3%)
7	5MU	A	2177	7	19,22,23	2.28	8 (42%)	28,32,35	2.40	6 (21%)
7	OMG	A	2791	7	18,26,27	2.68	6 (33%)	19,38,41	1.49	4 (21%)
32	2MG	a	959	32	18,26,27	2.96	4 (22%)	16,38,41	1.25	2 (12%)
32	UR3	a	1491	32	19,22,23	2.78	4 (21%)	26,32,35	1.21	2 (7%)
32	MA6	a	1512	32	19,26,27	0.77	0	18,38,41	1.51	2 (11%)
32	4OC	a	1395	32	20,23,24	2.56	4 (20%)	26,32,35	0.90	1 (3%)
7	6MZ	A	2268	7	18,25,26	1.70	1 (5%)	16,36,39	2.54	3 (18%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
32	5MC	a	960	32	18,22,23	1.89	6 (33%)	26,32,35	1.17	1 (3%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
32	MA6	a	1511	32	-	0/7/29/30	0/3/3/3
32	2MG	a	1509	32	-	0/5/27/28	0/3/3/3
32	G7M	a	518	32	-	0/3/25/26	0/3/3/3
7	OMG	A	2489	7	-	3/5/27/28	0/3/3/3
7	OMC	A	2736	54,7	-	0/9/27/28	0/2/2/2
7	5MU	A	2177	7	-	0/7/25/26	0/2/2/2
7	OMG	A	2791	7	-	0/5/27/28	0/3/3/3
32	2MG	a	959	32	-	3/5/27/28	0/3/3/3
32	UR3	a	1491	32	-	1/7/25/26	0/2/2/2
32	MA6	a	1512	32	-	2/7/29/30	0/3/3/3
32	4OC	a	1395	32	-	0/9/29/30	0/2/2/2
7	6MZ	A	2268	7	-	2/5/27/28	0/3/3/3
32	5MC	a	960	32	-	0/7/25/26	0/2/2/2

All (48) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
32	a	1491	UR3	O4-C4	10.14	1.45	1.23
32	a	518	G7M	O6-C6	9.96	1.43	1.23
32	a	959	2MG	O6-C6	9.16	1.41	1.23
32	a	1509	2MG	O6-C6	9.03	1.41	1.23
32	a	1395	4OC	O2-C2	9.00	1.40	1.23
7	A	2489	OMG	O6-C6	8.36	1.40	1.23
7	A	2791	OMG	O6-C6	8.31	1.40	1.23
32	a	959	2MG	C2-N2	6.86	1.48	1.33
32	a	1509	2MG	C2-N2	6.76	1.48	1.33
7	A	2268	6MZ	C6-N6	6.38	1.45	1.35
7	A	2736	OMC	C4-N4	5.58	1.47	1.33
32	a	1395	4OC	C4-N4	4.72	1.45	1.35
7	A	2791	OMG	C2-N2	4.70	1.45	1.34
7	A	2489	OMG	C2-N2	4.65	1.45	1.34
7	A	2177	5MU	C2-N1	-4.42	1.31	1.38
32	a	960	5MC	C4-N4	4.39	1.45	1.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
32	a	1491	UR3	C2-N1	-3.97	1.32	1.38
7	A	2177	5MU	C4-N3	-3.88	1.31	1.38
7	A	2177	5MU	C4-C5	-3.78	1.38	1.44
7	A	2177	5MU	C2-N3	-3.68	1.31	1.38
32	a	518	G7M	C2-N2	3.64	1.42	1.34
7	A	2177	5MU	C6-N1	-3.62	1.31	1.38
32	a	1395	4OC	C2-N1	-3.58	1.32	1.40
7	A	2489	OMG	C6-N1	-3.56	1.32	1.37
32	a	960	5MC	C2-N1	-3.54	1.32	1.40
7	A	2791	OMG	C6-N1	-3.48	1.32	1.37
7	A	2791	OMG	C5-C6	-3.31	1.40	1.47
32	a	960	5MC	C6-N1	-3.22	1.32	1.38
7	A	2489	OMG	C5-C6	-3.21	1.40	1.47
32	a	1509	2MG	C6-N1	-3.20	1.33	1.37
32	a	1491	UR3	C2-N3	-2.98	1.33	1.39
32	a	518	G7M	C6-N1	-2.96	1.33	1.37
32	a	1491	UR3	C4-N3	-2.96	1.34	1.40
32	a	959	2MG	C6-N1	-2.96	1.33	1.37
7	A	2177	5MU	O4-C4	-2.77	1.18	1.23
32	a	960	5MC	C6-C5	2.71	1.39	1.34
7	A	2177	5MU	O2-C2	-2.71	1.18	1.23
32	a	960	5MC	O2-C2	-2.64	1.18	1.23
7	A	2177	5MU	C6-C5	2.47	1.38	1.34
32	a	1509	2MG	C5-C6	-2.40	1.42	1.47
7	A	2736	OMC	C2-N1	-2.37	1.34	1.40
32	a	959	2MG	C5-C6	-2.33	1.42	1.47
32	a	518	G7M	C2-N1	-2.29	1.32	1.37
32	a	1395	4OC	C6-N1	-2.24	1.32	1.38
7	A	2791	OMG	C2-N1	-2.10	1.32	1.37
7	A	2791	OMG	C5-C4	-2.05	1.37	1.43
7	A	2489	OMG	C2-N1	-2.05	1.32	1.37
32	a	960	5MC	C2-N3	-2.02	1.32	1.36

All (31) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	A	2268	6MZ	C9-N6-C6	-7.06	116.79	122.87
7	A	2177	5MU	C5-C6-N1	-5.86	117.31	123.34
7	A	2177	5MU	C4-N3-C2	-5.85	119.78	127.35
7	A	2177	5MU	N3-C2-N1	5.46	122.14	114.89
7	A	2268	6MZ	C2-N1-C6	5.10	120.97	116.59
7	A	2177	5MU	C5-C4-N3	5.03	119.60	115.31

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
32	a	1511	MA6	N3-C2-N1	-4.83	121.13	128.68
32	a	1512	MA6	N3-C2-N1	-4.79	121.19	128.68
32	a	960	5MC	C5-C6-N1	-4.46	118.75	123.34
7	A	2268	6MZ	N3-C2-N1	-4.33	121.91	128.68
32	a	1491	UR3	C4-N3-C2	-3.92	120.88	124.56
7	A	2177	5MU	O4-C4-C5	-3.86	120.43	124.90
7	A	2791	OMG	C5-C6-N1	3.76	120.60	113.95
7	A	2489	OMG	C5-C6-N1	3.70	120.48	113.95
32	a	1512	MA6	C4-C5-N7	-3.26	106.00	109.40
32	a	1511	MA6	C4-C5-N7	-3.20	106.07	109.40
7	A	2791	OMG	C8-N7-C5	2.97	108.65	102.99
7	A	2177	5MU	O2-C2-N1	-2.95	118.87	122.79
32	a	1509	2MG	C8-N7-C5	2.94	108.59	102.99
32	a	959	2MG	C8-N7-C5	2.93	108.57	102.99
7	A	2489	OMG	C8-N7-C5	2.90	108.52	102.99
7	A	2489	OMG	C2-N1-C6	-2.84	119.86	125.10
7	A	2791	OMG	C2-N1-C6	-2.82	119.90	125.10
7	A	2736	OMC	O2-C2-N3	-2.65	118.02	122.33
7	A	2791	OMG	O6-C6-C5	-2.47	119.55	124.37
32	a	518	G7M	C2-N1-C6	-2.36	120.75	125.10
7	A	2489	OMG	O6-C6-C5	-2.34	119.80	124.37
32	a	1509	2MG	CM2-N2-C2	-2.09	119.24	123.86
32	a	1395	4OC	C5-C4-N3	-2.08	119.24	122.59
32	a	1491	UR3	C5-C6-N1	-2.07	118.34	121.81
32	a	959	2MG	C5-C6-N1	2.03	117.53	113.95

There are no chirality outliers.

All (11) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
7	A	2489	OMG	O4'-C4'-C5'-O5'
7	A	2489	OMG	C1'-C2'-O2'-CM2
32	a	959	2MG	N1-C2-N2-CM2
32	a	959	2MG	N3-C2-N2-CM2
7	A	2268	6MZ	O4'-C4'-C5'-O5'
7	A	2268	6MZ	C3'-C4'-C5'-O5'
7	A	2489	OMG	C3'-C4'-C5'-O5'
32	a	1512	MA6	O4'-C4'-C5'-O5'
32	a	1491	UR3	O4'-C4'-C5'-O5'
32	a	959	2MG	C4'-C5'-O5'-P
32	a	1512	MA6	C3'-C4'-C5'-O5'

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 454 ligands modelled in this entry, 453 are monoatomic - leaving 1 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
53	WDP	A	3201	-	83,90,90	2.45	21 (25%)	102,132,132	2.26	18 (17%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
53	WDP	A	3201	-	-	37/103/158/158	1/4/5/5

All (21) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
53	A	3201	WDP	C18-N20	8.92	1.50	1.35
53	A	3201	WDP	S26-N25	7.37	1.73	1.61
53	A	3201	WDP	C62-N61	-6.42	1.33	1.46
53	A	3201	WDP	O17-C18	5.99	1.46	1.34
53	A	3201	WDP	O50-C51	5.82	1.47	1.34
53	A	3201	WDP	C04-N03	-5.33	1.22	1.27
53	A	3201	WDP	C14-C15	5.05	1.62	1.53
53	A	3201	WDP	O40-C41	4.66	1.47	1.34
53	A	3201	WDP	C43-C41	4.51	1.59	1.50

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
53	A	3201	WDP	C29-S26	4.29	1.83	1.76
53	A	3201	WDP	C59-N61	-4.03	1.35	1.48
53	A	3201	WDP	O17-C15	-4.00	1.41	1.46
53	A	3201	WDP	C24-C21	3.19	1.57	1.53
53	A	3201	WDP	O74-C73	2.84	1.49	1.41
53	A	3201	WDP	C24-N25	2.81	1.50	1.47
53	A	3201	WDP	C82-C79	-2.65	1.46	1.52
53	A	3201	WDP	O27-S26	2.38	1.46	1.43
53	A	3201	WDP	C53-C51	2.35	1.56	1.51
53	A	3201	WDP	O19-C18	-2.14	1.17	1.21
53	A	3201	WDP	C60-C59	2.13	1.59	1.52
53	A	3201	WDP	O02-C01	-2.02	1.40	1.43

All (18) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
53	A	3201	WDP	O28-S26-O27	-14.94	101.18	119.55
53	A	3201	WDP	O17-C18-N20	7.55	119.98	109.92
53	A	3201	WDP	C05-C04-N03	-5.83	120.13	126.93
53	A	3201	WDP	O02-N03-C04	5.35	119.95	110.97
53	A	3201	WDP	O40-C41-C43	4.61	119.94	111.46
53	A	3201	WDP	O50-C51-C53	3.96	120.25	111.56
53	A	3201	WDP	O19-C18-N20	-3.31	119.98	124.95
53	A	3201	WDP	O17-C18-O19	-3.06	120.04	125.62
53	A	3201	WDP	O28-S26-N25	2.72	111.29	107.04
53	A	3201	WDP	O28-S26-C29	2.72	111.32	107.97
53	A	3201	WDP	O27-S26-N25	2.72	111.29	107.04
53	A	3201	WDP	O27-S26-C29	2.66	111.24	107.97
53	A	3201	WDP	C49-O50-C51	-2.41	113.64	117.78
53	A	3201	WDP	C76-C75-C77	-2.30	108.82	113.07
53	A	3201	WDP	C07-C06-C05	-2.28	108.78	113.22
53	A	3201	WDP	O50-C51-O52	-2.18	119.86	123.94
53	A	3201	WDP	O42-C41-C43	-2.13	120.03	124.73
53	A	3201	WDP	O10-C11-C67	2.01	110.65	108.22

There are no chirality outliers.

All (37) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
53	A	3201	WDP	C22-C21-C24-N25
53	A	3201	WDP	C23-C21-C24-N25
53	A	3201	WDP	N20-C21-C24-N25

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Mol	Chain	Res	Type	Atoms
53	A	3201	WDP	C22-C21-N20-C18
53	A	3201	WDP	C24-C21-N20-C18
53	A	3201	WDP	C21-C24-N25-S26
53	A	3201	WDP	C05-C04-N03-O02
53	A	3201	WDP	C85-C04-N03-O02
53	A	3201	WDP	C12-C11-C67-C55
53	A	3201	WDP	O17-C18-N20-C21
53	A	3201	WDP	O19-C18-N20-C21
53	A	3201	WDP	N20-C18-O17-C15
53	A	3201	WDP	O19-C18-O17-C15
53	A	3201	WDP	C15-C35-C37-C38
53	A	3201	WDP	O36-C35-C37-C38
53	A	3201	WDP	C37-C39-O40-C41
53	A	3201	WDP	C47-C39-O40-C41
53	A	3201	WDP	C43-C41-O40-C39
53	A	3201	WDP	C49-C69-C71-O72
53	A	3201	WDP	C70-C69-C71-O72
53	A	3201	WDP	C04-N03-O02-C01
53	A	3201	WDP	O42-C41-O40-C39
53	A	3201	WDP	O08-C09-O10-C11
53	A	3201	WDP	C24-N25-S26-O28
53	A	3201	WDP	O10-C11-C67-C55
53	A	3201	WDP	C23-C21-N20-C18
53	A	3201	WDP	C12-C11-C67-C68
53	A	3201	WDP	C24-N25-S26-O27
53	A	3201	WDP	C24-N25-S26-C29
53	A	3201	WDP	C41-C43-C44-C45
53	A	3201	WDP	C82-C73-O72-C71
53	A	3201	WDP	O10-C11-C67-C68
53	A	3201	WDP	C37-C39-C47-C49
53	A	3201	WDP	C16-C15-O17-C18
53	A	3201	WDP	C41-C43-C44-C46
53	A	3201	WDP	C82-C79-O80-C81
53	A	3201	WDP	C38-C37-C39-O40

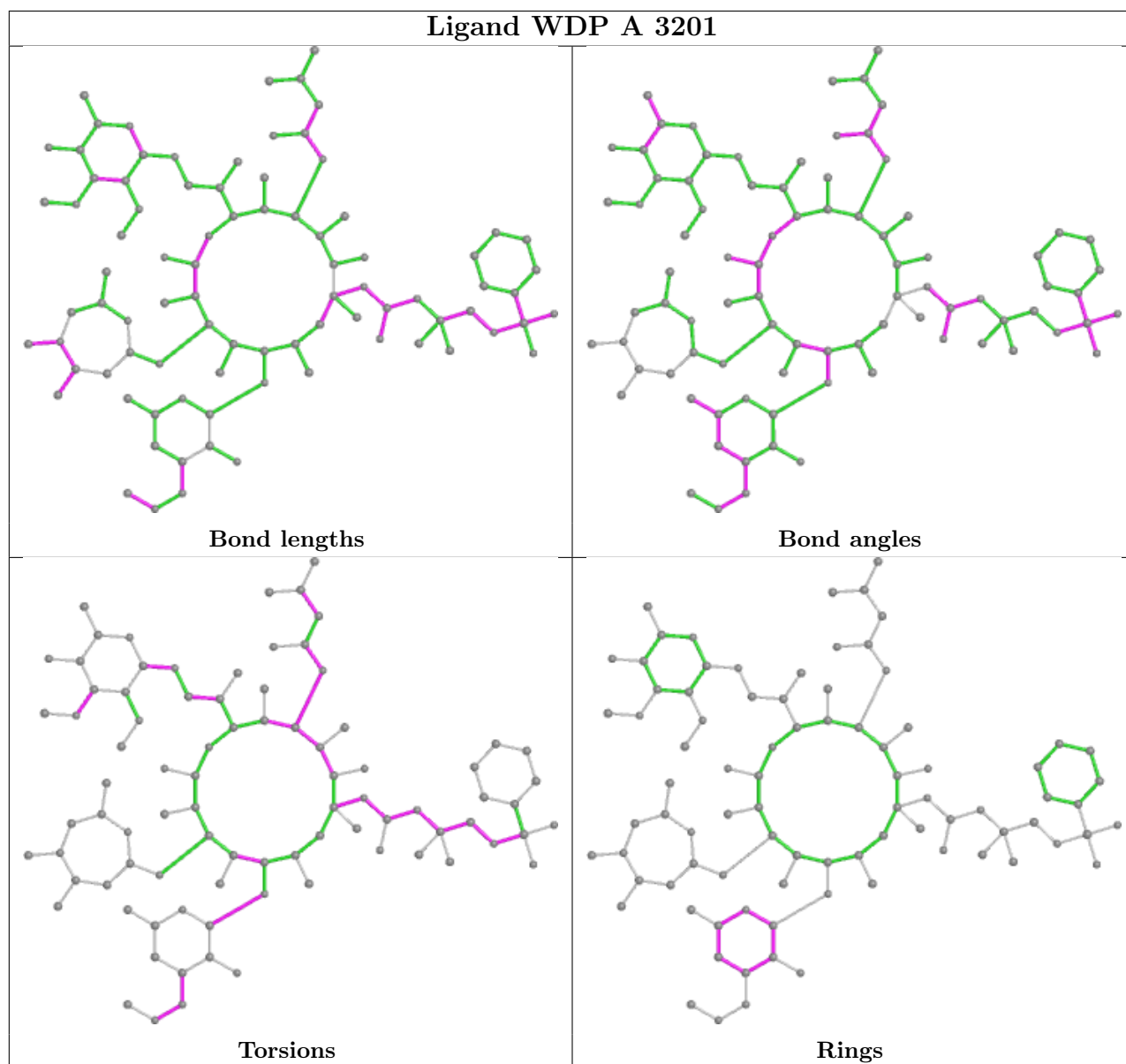
All (1) ring outliers are listed below:

Mol	Chain	Res	Type	Atoms
53	A	3201	WDP	C04-C05-C06-C09-C85-O08

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

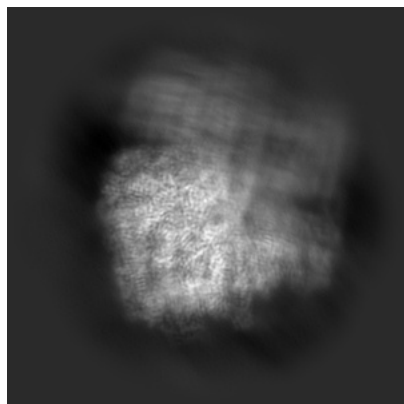
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-25100. These allow visual inspection of the internal detail of the map and identification of artifacts.

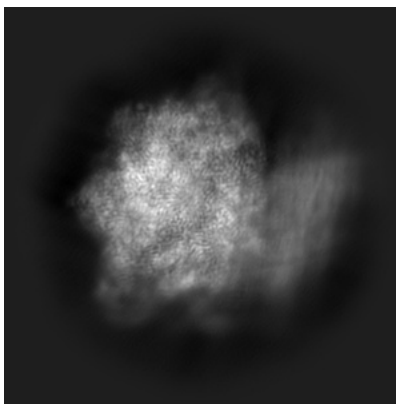
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections [i](#)

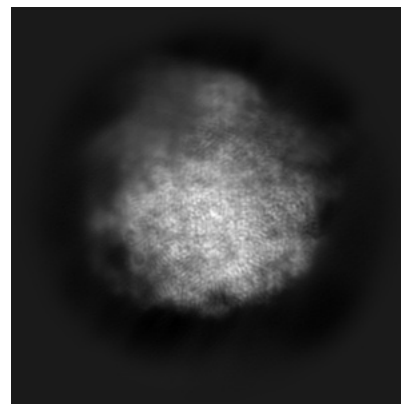
6.1.1 Primary map



X

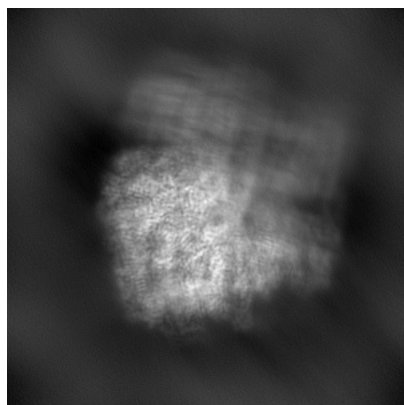


Y

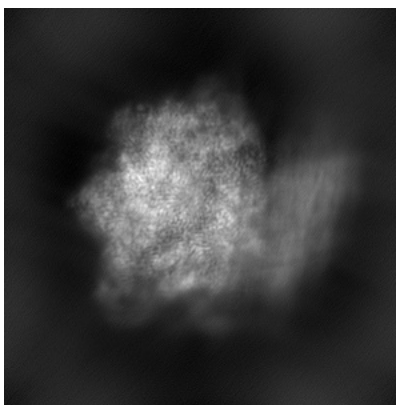


Z

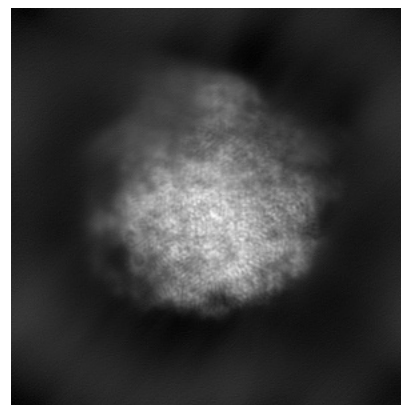
6.1.2 Raw map



X



Y

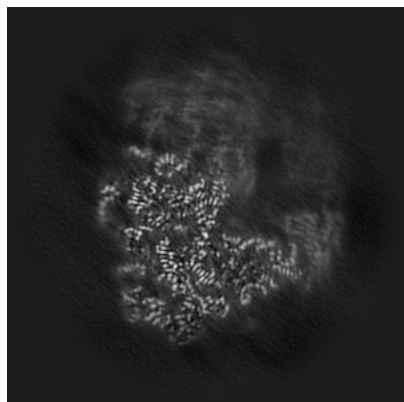


Z

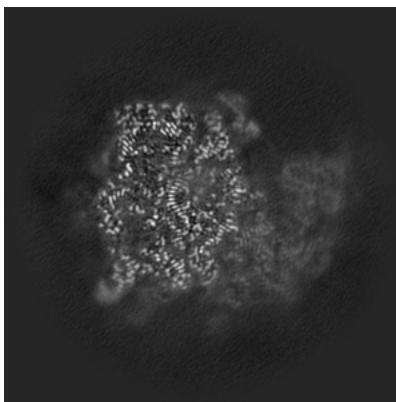
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

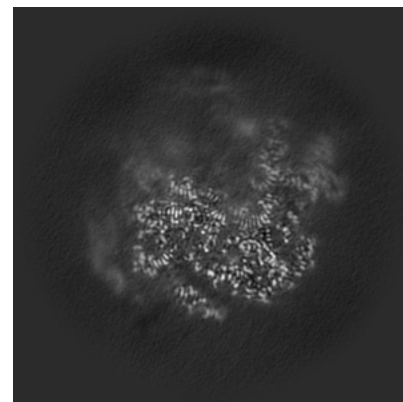
6.2.1 Primary map



X Index: 210

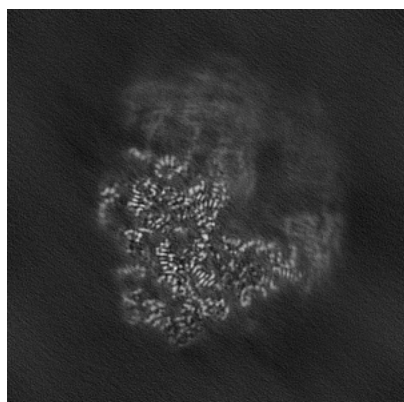


Y Index: 210

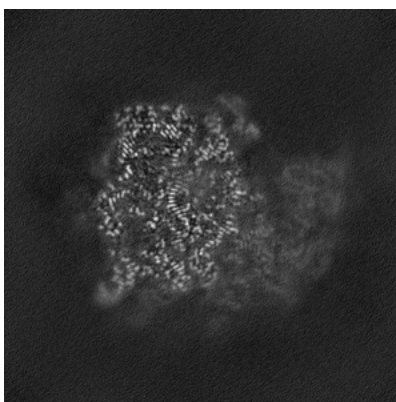


Z Index: 210

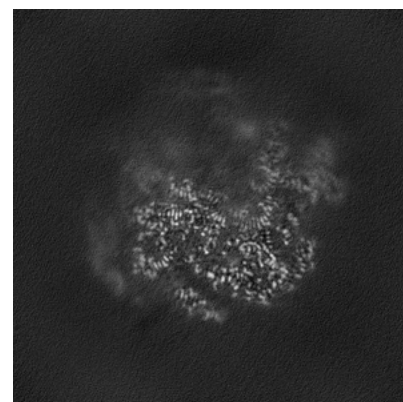
6.2.2 Raw map



X Index: 210



Y Index: 210

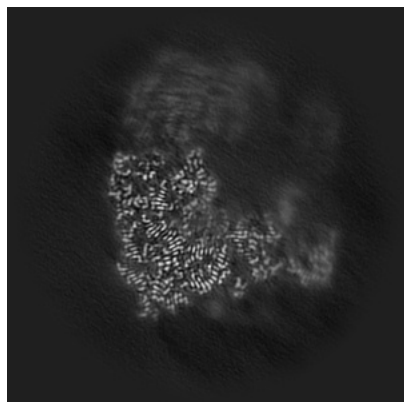


Z Index: 210

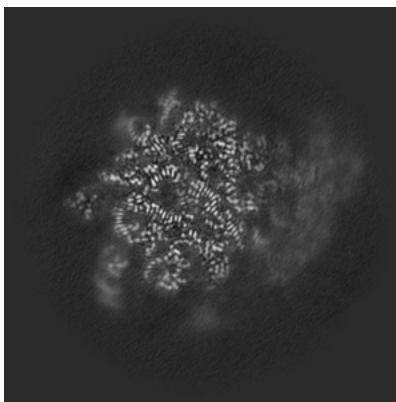
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

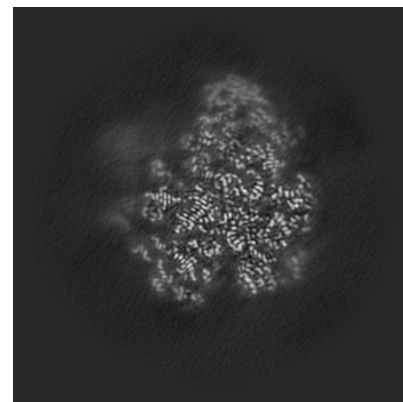
6.3.1 Primary map



X Index: 244

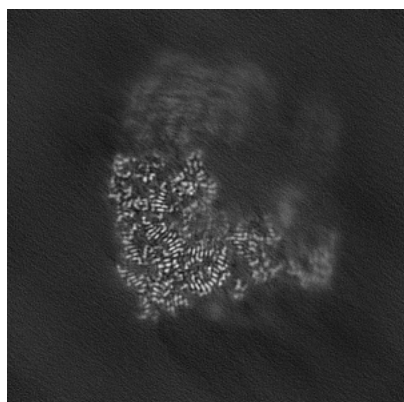


Y Index: 172

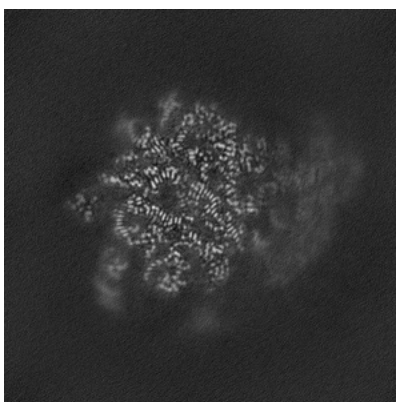


Z Index: 158

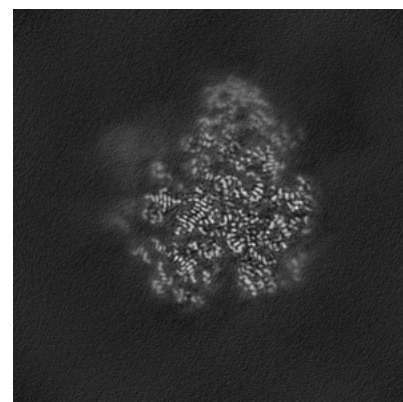
6.3.2 Raw map



X Index: 244



Y Index: 172



Z Index: 158

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

6.4 Orthogonal surface views [i](#)

6.4.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.4. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.4.2 Raw map



X



Y



Z

These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

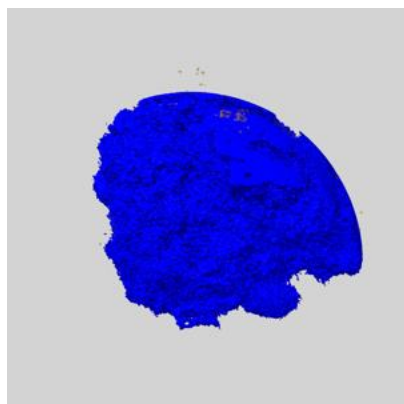
6.5 Mask visualisation [i](#)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

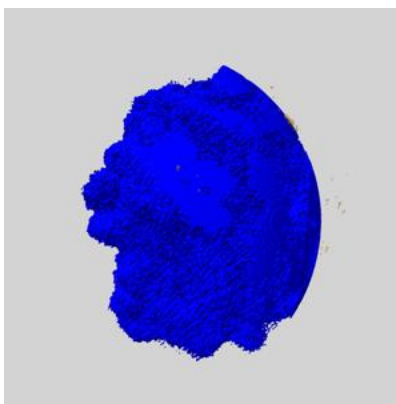
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

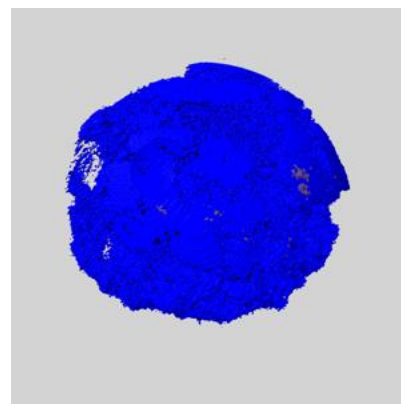
6.5.1 emd_25100_msk_1.map [i](#)



X



Y

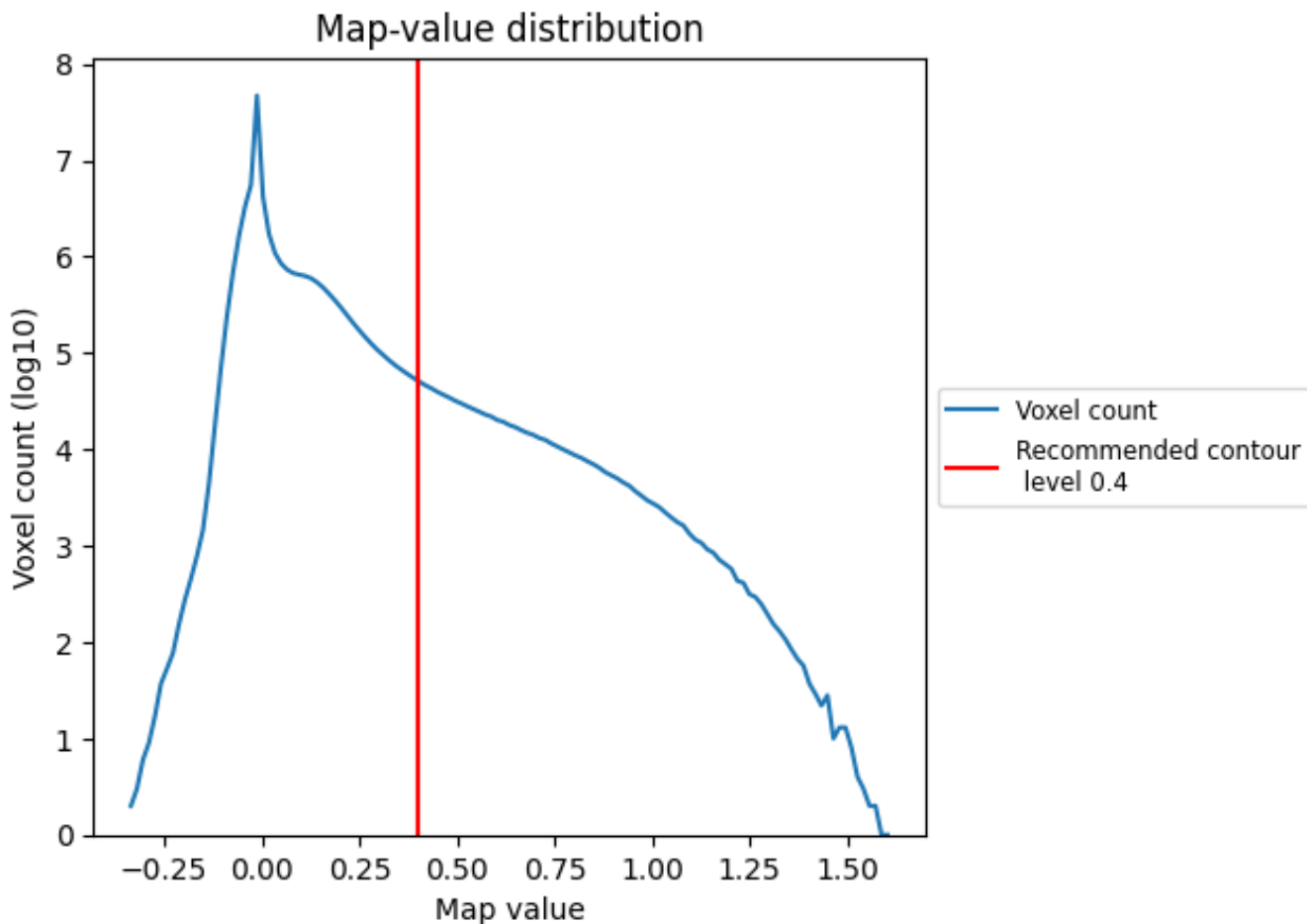


Z

7 Map analysis [i](#)

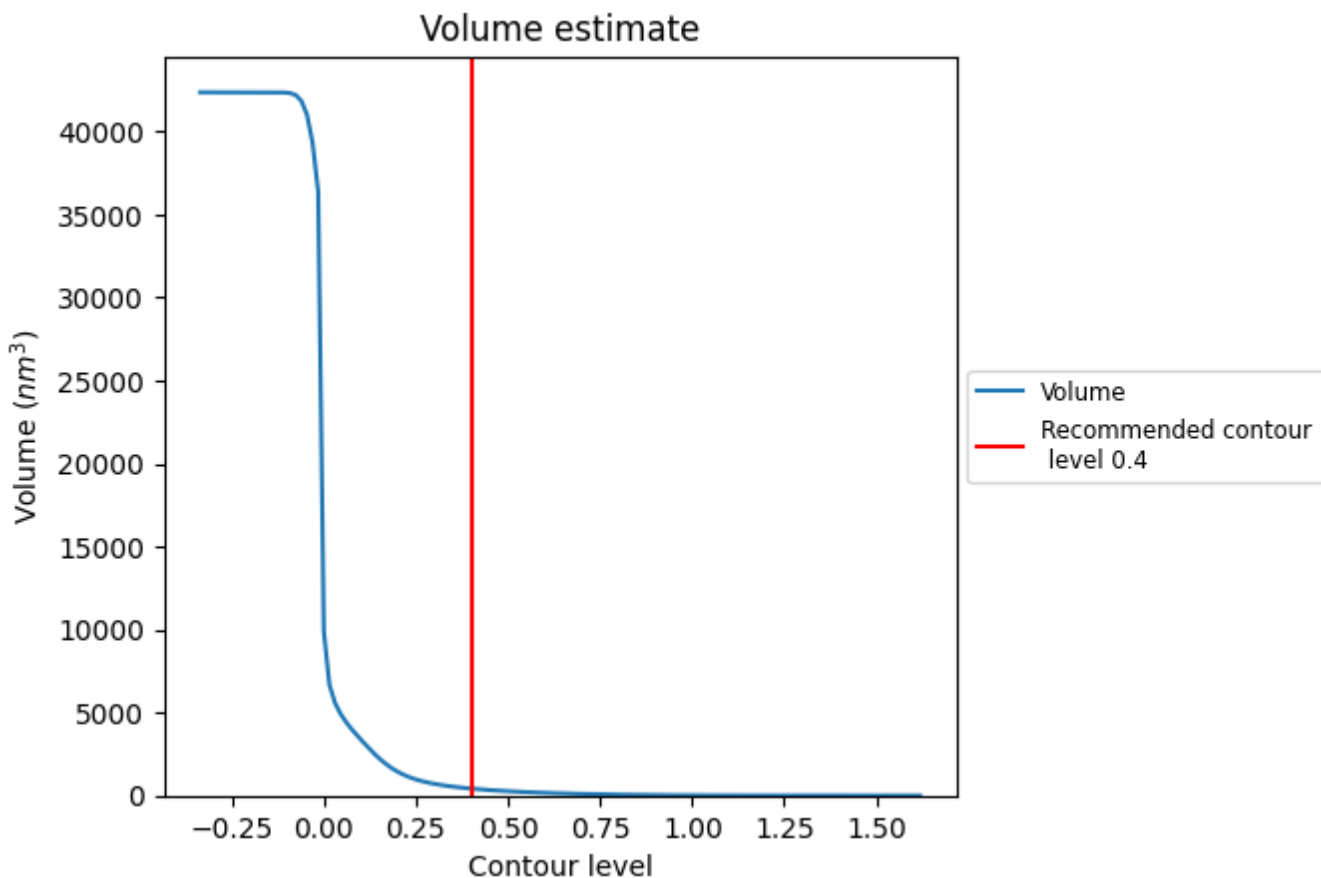
This section contains the results of statistical analysis of the map.

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.

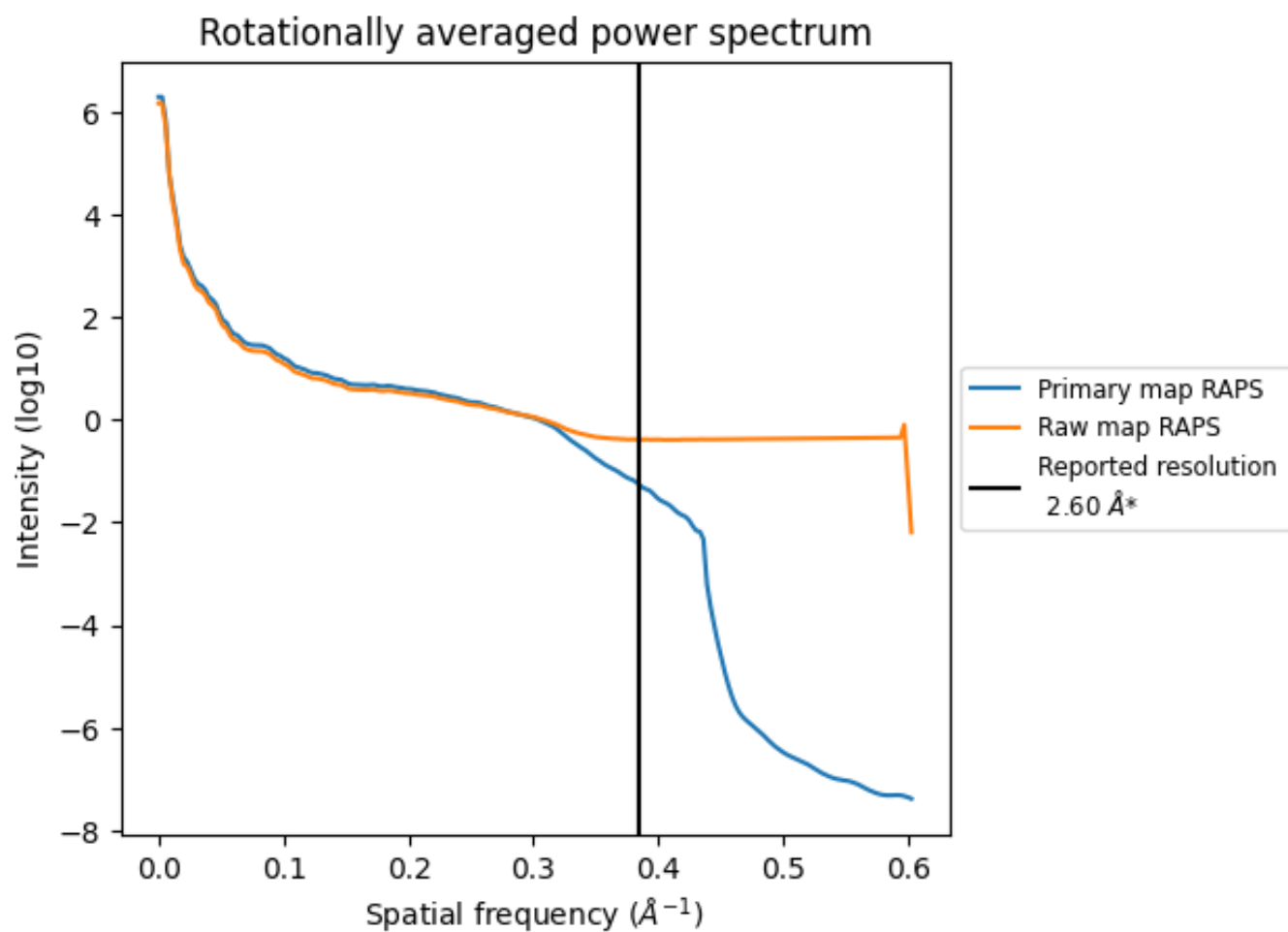
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 418 nm^3 ; this corresponds to an approximate mass of 377 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

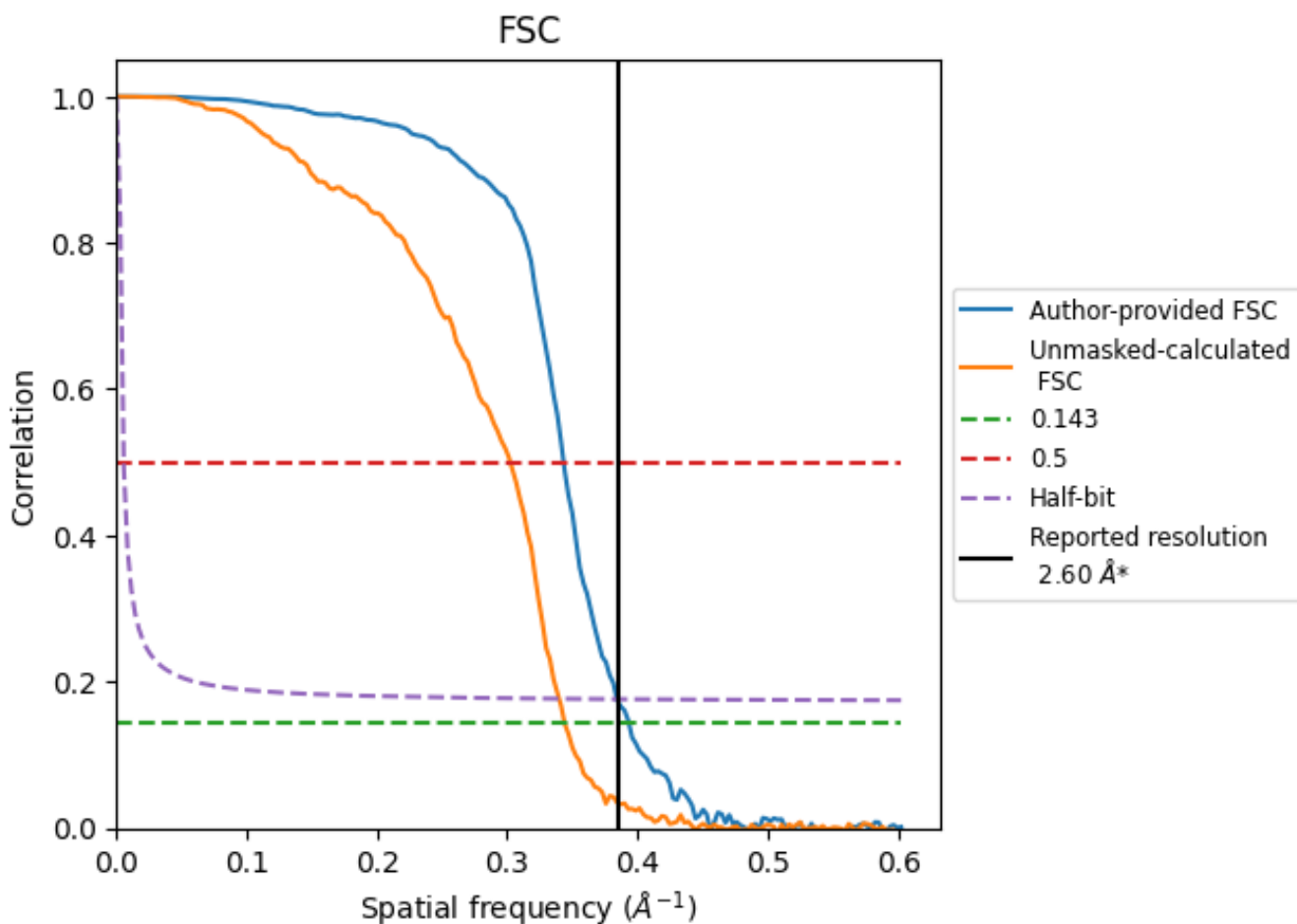


*Reported resolution corresponds to spatial frequency of 0.385 Å⁻¹

8 Fourier-Shell correlation [i](#)

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC [i](#)



*Reported resolution corresponds to spatial frequency of 0.385 Å⁻¹

8.2 Resolution estimates [i](#)

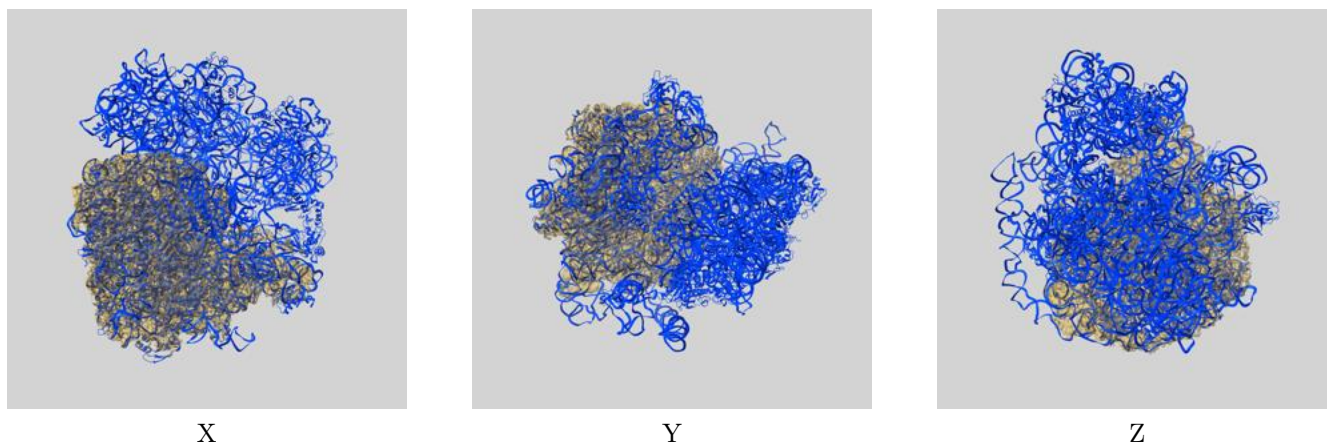
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.60	-	-
Author-provided FSC curve	2.54	2.91	2.60
Unmasked-calculated*	2.91	3.31	2.94

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 2.91 differs from the reported value 2.6 by more than 10 %

9 Map-model fit [i](#)

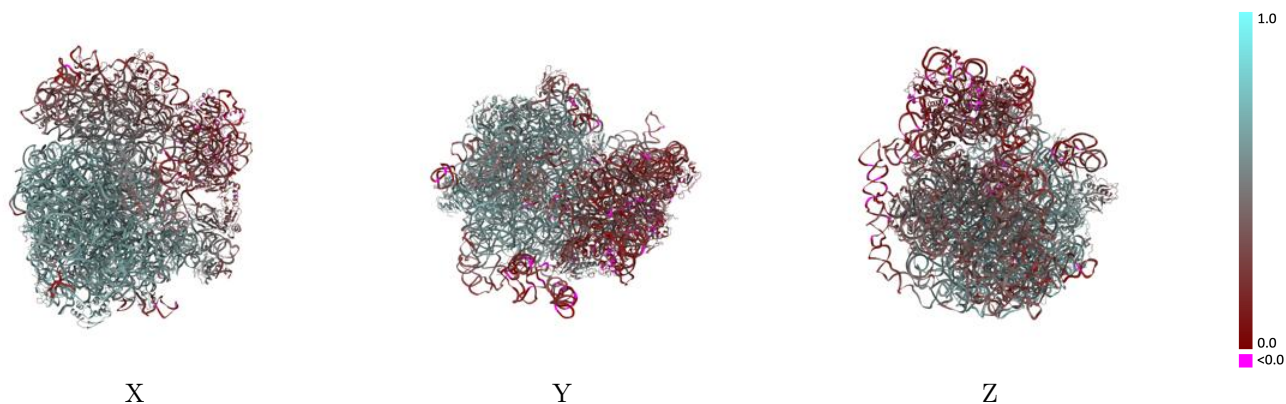
This section contains information regarding the fit between EMDB map EMD-25100 and PDB model 7SFR. Per-residue inclusion information can be found in section 3 on page 14.

9.1 Map-model overlay [i](#)



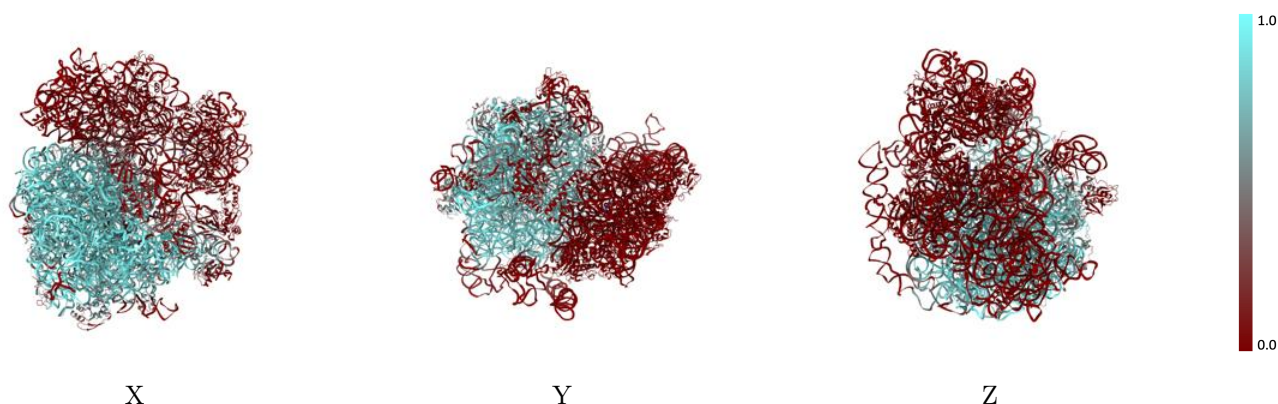
The images above show the 3D surface view of the map at the recommended contour level 0.4 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



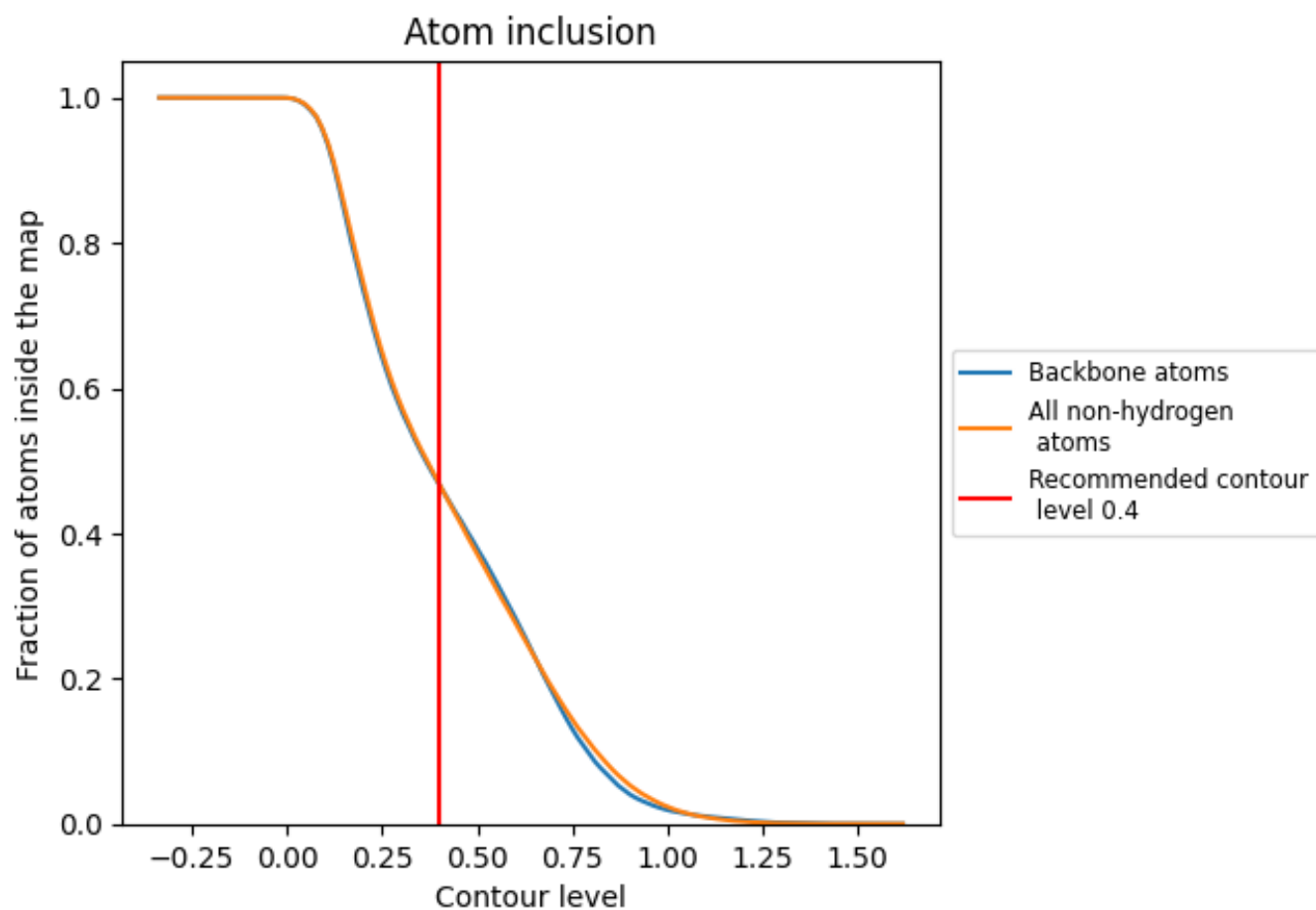
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

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



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.4).







































































9.4 Atom inclusion [i](#)



At the recommended contour level, 47% of all backbone atoms, 47% 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 (0.4) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.4681	 0.4680
0	 0.4537	 0.6090
1	 0.6701	 0.5810
2	 0.9573	 0.6490
3	 0.7055	 0.6210
4	 0.1910	 0.5570
6	 0.0000	 0.2530
A	 0.7685	 0.5450
B	 0.5465	 0.4700
C	 0.8569	 0.6210
D	 0.7294	 0.6040
E	 0.6066	 0.5910
F	 0.0140	 0.3610
G	 0.0402	 0.4250
H	 0.0262	 0.3940
J	 0.8133	 0.6090
K	 0.6925	 0.6030
L	 0.6590	 0.5850
M	 0.1205	 0.5530
N	 0.8348	 0.6250
O	 0.2182	 0.4590
P	 0.6230	 0.5890
Q	 0.8515	 0.6190
R	 0.6471	 0.6010
S	 0.8141	 0.6220
T	 0.6409	 0.5780
U	 0.4141	 0.5220
V	 0.0436	 0.4840
W	 0.7623	 0.5990
X	 0.7662	 0.6190
Y	 0.5869	 0.5510
Z	 0.6989	 0.5880
a	 0.0181	 0.3330
c	 0.0000	 0.2250
d	 0.0000	 0.2260



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Chain	Atom inclusion	Q-score
e	 0.0000	 0.3140
f	 0.0000	 0.4430
g	 0.0000	 0.2290
h	 0.0000	 0.3360
i	 0.0000	 0.1610
j	 0.0000	 0.1700
k	 0.0000	 0.4060
l	 0.0000	 0.3460
m	 0.0000	 0.2100
n	 0.0000	 0.2030
o	 0.0000	 0.4150
p	 0.0000	 0.3030
q	 0.0000	 0.3330
r	 0.0000	 0.4080
s	 0.0000	 0.1790
t	 0.0000	 0.3420
v	 0.0171	 0.5040