wwPDB EM Validation Summary Report (i)

Mar 17, 2026 – 12:43 PM UTC

PDB ID	:	8Y5N / pdb_00008y5n
EMDB ID	:	EMD-38943
Title	:	E.coli transcription translation coupling complex in TTC-A state 3 containing mRNA with 21-mer spacer, NusG, NusA, fMet-tRNA(iMet), Phe-tRNA(Phe), and viomycin
Authors	:	Zhang, J.; Lu, G.; Wang, C.; Lin, J.
Deposited on	:	2024-01-31
Resolution	:	4.50 Å(reported)

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

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/EMValidationReportHelp
with specific help available everywhere you see the (i) 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 (i)) were used in the production of this report:

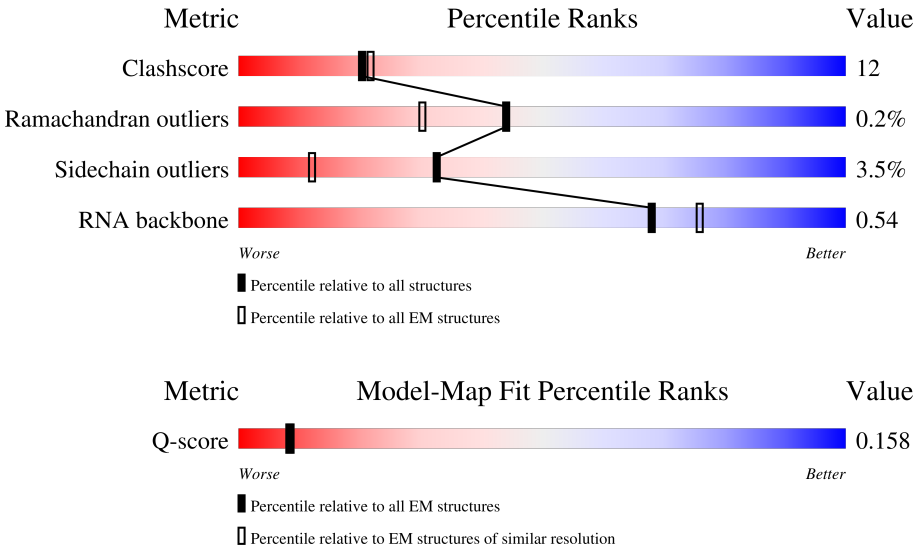
EMDB validation analysis	:	0.0.1.dev132
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4-5-2 with Phenix2.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics	:	202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 4.50 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
RNA backbone	8273	3508	-
Q-score	-	25397	2937 (4.00 - 5.00)

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

Mol	Chain	Length	Quality of chain
1	A	70	50% 16% 34%
2	B	57	67% 30% . .
3	C	55	49% 42% 9%

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Mol	Chain	Length	Quality of chain
4	D	46	59% 37%
5	E	65	66% 31%
6	F	38	61% 39%
7	G	241	64% 25% 10%
8	H	233	58% 27% 12%
9	I	206	70% 28%
10	J	167	65% 29% 6%
11	K	135	50% 21% 26%
12	L	179	60% 22% 16%
13	M	130	67% 32%
14	N	130	45% 53%
15	O	103	56% 37% 5%
16	P	129	63% 27% 10%
17	Q	124	73% 26%
18	R	118	69% 28%
19	S	101	60% 39%
20	T	89	78% 21%
21	U	82	72% 28%
22	V	84	67% 29% 5%
23	W	75	65% 21% 13%
24	X	92	64% 22% 14%
25	Y	87	64% 33%
26	Z	71	62% 24% 6% 8%
27	b	273	70% 29%
28	c	209	68% 32%

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Mol	Chain	Length	Quality of chain
29	d	201	65% 34%
30	e	179	72% 26%
31	f	177	78% 21%
32	g	149	74% 23%
33	i	142	7% 68% 32%
34	j	142	80% 20%
35	k	123	76% 21%
36	l	144	76% 22%
37	m	136	71% 28%
38	n	127	62% 31% 6%
39	o	117	71% 28%
40	p	115	76% 23%
41	q	118	76% 23%
42	r	103	71% 29%
43	s	110	73% 27%
44	t	100	65% 27% 7%
45	u	104	77% 20%
46	v	94	78% 22%
47	w	85	66% 22% 12%
48	x	78	67% 29%
49	y	63	78% 22%
50	z	59	75% 24%
51	1	2904	44% 48% 8%
52	2	120	50% 40% 10%
53	3	1542	45% 49% 6%

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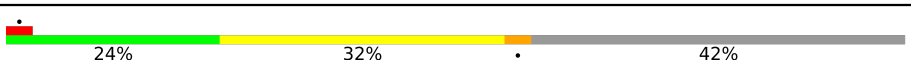
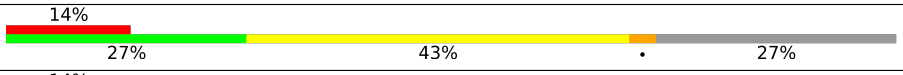
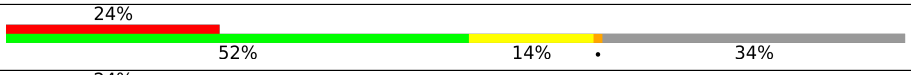
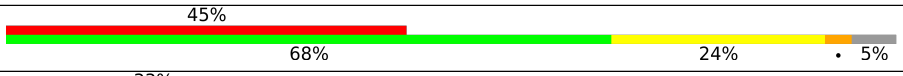
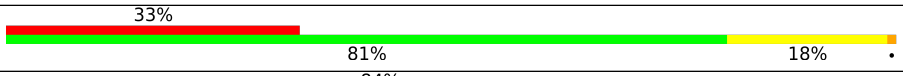
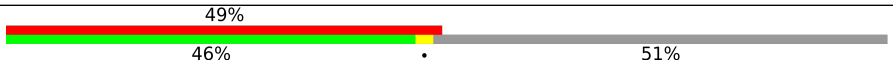
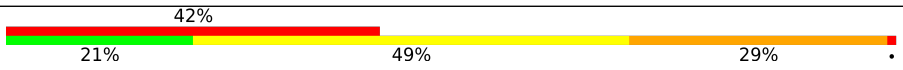
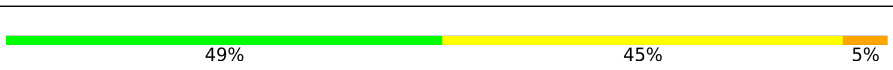
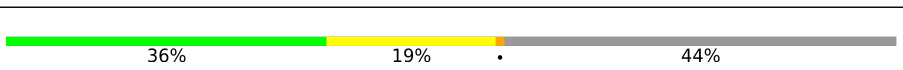
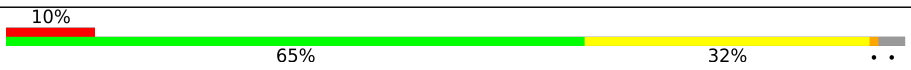
Mol	Chain	Length	Quality of chain
54	4	38	
55	8	37	
56	9	37	
57	A1	329	
57	A2	329	
58	B1	1407	
59	B2	1342	
60	W0	91	
61	NG	181	
62	5	76	
63	6	77	
64	a	234	
65	0	716	
66	h	6	

2 Entry composition (i)

There are 68 unique types of molecules in this entry. The entry contains 179711 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 L31.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	46	355	221	62	66	6	0	0

- Molecule 2 is a protein called 50S ribosomal protein L32.

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

- Molecule 3 is a protein called 50S ribosomal protein L33.

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

- Molecule 4 is a protein called 50S ribosomal protein L34.

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

- Molecule 5 is a protein called 50S ribosomal protein L35.

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

- Molecule 6 is a protein called 50S ribosomal protein L36.

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

- Molecule 7 is a protein called 30S ribosomal protein S2.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	G	218	Total	C	N	O	S	0	0
			1704	1081	305	311	7		

- Molecule 8 is a protein called 30S ribosomal protein S3.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	H	206	Total	C	N	O	S	0	0
			1624	1028	305	288	3		

- Molecule 9 is a protein called 30S ribosomal protein S4.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	I	205	Total	C	N	O	S	0	0
			1637	1023	312	298	4		

- Molecule 10 is a protein called 30S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	J	157	Total	C	N	O	S	0	0
			1156	719	218	213	6		

- Molecule 11 is a protein called 30S ribosomal protein S6, fully modified isoform.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	K	100	Total	C	N	O	S	0	0
			817	515	148	148	6		

- Molecule 12 is a protein called 30S ribosomal protein S7.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	L	151	Total	C	N	O	S	0	0
			1181	735	227	215	4		

- Molecule 13 is a protein called 30S ribosomal protein S8.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	M	129	Total	C	N	O	S	0	0
			979	616	173	184	6		

- Molecule 14 is a protein called 30S ribosomal protein S9.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	N	127	Total	C	N	O	S	0	0
			1022	634	206	179	3		

- Molecule 15 is a protein called 30S ribosomal protein S10.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	O	98	Total	C	N	O	S	0	0
			786	493	150	142	1		

- Molecule 16 is a protein called 30S ribosomal protein S11.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	P	116	Total	C	N	O	S	0	0
			869	535	173	158	3		

- Molecule 17 is a protein called 30S ribosomal protein S12.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	Q	123	Total	C	N	O	S	0	0
			955	590	196	165	4		

- Molecule 18 is a protein called 30S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	R	114	Total	C	N	O	S	0	0
			883	546	178	156	3		

- Molecule 19 is a protein called 30S ribosomal protein S14.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	S	100	Total	C	N	O	S	0	0
			805	499	164	139	3		

- Molecule 20 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	T	88	Total	C	N	O	S	0	0
			714	439	144	130	1		

- Molecule 21 is a protein called 30S ribosomal protein S16.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	U	82	Total	C	N	O	S	0	0
			649	406	128	114	1		

- Molecule 22 is a protein called 30S ribosomal protein S17.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	V	80	Total	C	N	O	S	0	0
			648	411	121	113	3		

- Molecule 23 is a protein called 30S ribosomal protein S18.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	W	65	Total	C	N	O	S	0	0
			535	339	100	95	1		

- Molecule 24 is a protein called 30S ribosomal protein S19.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	X	79	Total	C	N	O	S	0	0
			637	408	120	107	2		

- Molecule 25 is a protein called 30S ribosomal protein S20.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	Y	85	Total	C	N	O	S	0	0
			665	411	137	114	3		

- Molecule 26 is a protein called 30S ribosomal protein S21.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	Z	65	Total	C	N	O	S	0	0
			544	335	117	91	1		

- Molecule 27 is a protein called 50S ribosomal protein L2.

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

- Molecule 28 is a protein called 50S ribosomal protein L3.

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

- Molecule 29 is a protein called 50S ribosomal protein L4.

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

- Molecule 30 is a protein called 50S ribosomal protein L5.

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

- Molecule 31 is a protein called 50S ribosomal protein L6.

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

- Molecule 32 is a protein called 50S ribosomal protein L9.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	g	149	Total	C	N	O	S	0	0
			1111	699	197	214	1		

- Molecule 33 is a protein called 50S ribosomal protein L11.

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

- Molecule 34 is a protein called 50S ribosomal protein L13.

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

- Molecule 35 is a protein called 50S ribosomal protein L14.

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

- Molecule 36 is a protein called 50S ribosomal protein L15.

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

- Molecule 37 is a protein called 50S ribosomal protein L16.

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

- Molecule 38 is a protein called 50S ribosomal protein L17.

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

- Molecule 39 is a protein called 50S ribosomal protein L18.

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

- Molecule 40 is a protein called 50S ribosomal protein L19.

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

- Molecule 41 is a protein called 50S ribosomal protein L20.

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

- Molecule 42 is a protein called 50S ribosomal protein L21.

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

- Molecule 43 is a protein called 50S ribosomal protein L22.

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

- Molecule 44 is a protein called 50S ribosomal protein L23.

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

- Molecule 45 is a protein called 50S ribosomal protein L24.

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

- Molecule 46 is a protein called 50S ribosomal protein L25.

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

- Molecule 47 is a protein called 50S ribosomal protein L27.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	w	75	Total 575	C 356	N 116	O 102	S 1	0	0

- Molecule 48 is a protein called 50S ribosomal protein L28.

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

- Molecule 49 is a protein called 50S ribosomal protein L29.

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

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

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

- Molecule 51 is a RNA chain called 23S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
51	1	2903	Total	C	N	O	P	0	0
			62317	27801	11468	20146	2902		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
1	747	C	U	conflict	GB 1929590828

- Molecule 52 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
52	2	120	Total	C	N	O	P	0	0
			2568	1145	471	833	119		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
2	120	A	U	conflict	GB NR_103249

- Molecule 53 is a RNA chain called 16S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
53	3	1539	Total	C	N	O	P	0	0
			33012	14725	6052	10697	1538		

- Molecule 54 is a RNA chain called mRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
54	4	22	Total	C	N	O	P	0	0
			467	208	76	161	22		

- Molecule 55 is a DNA chain called templete DNA strand.

Mol	Chain	Residues	Atoms					AltConf	Trace
55	8	27	Total	C	N	O	P	0	0
			539	257	88	167	27		

- Molecule 56 is a DNA chain called non-templete DNA strand.

Mol	Chain	Residues	Atoms					AltConf	Trace
56	9	20	Total	C	N	O	P	0	0
			417	195	84	118	20		

- Molecule 57 is a protein called DNA-directed RNA polymerase subunit alpha.

Mol	Chain	Residues	Atoms					AltConf	Trace
57	A1	218	Total	C	N	O	S	0	0
			1677	1048	297	326	6		
57	A2	221	Total	C	N	O	S	0	0
			1698	1060	299	333	6		

- Molecule 58 is a protein called DNA-directed RNA polymerase subunit beta'.

Mol	Chain	Residues	Atoms					AltConf	Trace
58	B1	1335	Total	C	N	O	S	0	0
			10353	6509	1842	1955	47		

- Molecule 59 is a protein called DNA-directed RNA polymerase subunit beta.

Mol	Chain	Residues	Atoms					AltConf	Trace
59	B2	1340	Total	C	N	O	S	0	0
			10546	6616	1839	2048	43		

- Molecule 60 is a protein called DNA-directed RNA polymerase subunit omega.

Mol	Chain	Residues	Atoms					AltConf	Trace
60	W0	82	Total	C	N	O	S	0	0
			650	396	122	131	1		

- Molecule 61 is a protein called Transcription termination/antitermination protein NusG.

Mol	Chain	Residues	Atoms				AltConf	Trace
61	NG	88	Total	C	N	O	0	0
			433	257	88	88		

- Molecule 62 is a RNA chain called tRNA(Phe).

Mol	Chain	Residues	Atoms					AltConf	Trace
62	5	76	Total	C	N	O	P	0	0
			1622	723	290	533	76		

- Molecule 63 is a RNA chain called tRNA(fMet).

Mol	Chain	Residues	Atoms					AltConf	Trace
63	6	77	Total	C	N	O	P	0	0
			1640	732	297	535	76		

- Molecule 64 is a protein called Large ribosomal subunit protein uL1.

Mol	Chain	Residues	Atoms					AltConf	Trace
64	a	132	Total	C	N	O	S	0	0
			1013	638	183	190	2		

- Molecule 65 is a protein called Elongation factor G.

Mol	Chain	Residues	Atoms					AltConf	Trace
65	0	697	Total	C	N	O	S	0	0
			5399	3403	929	1042	25		

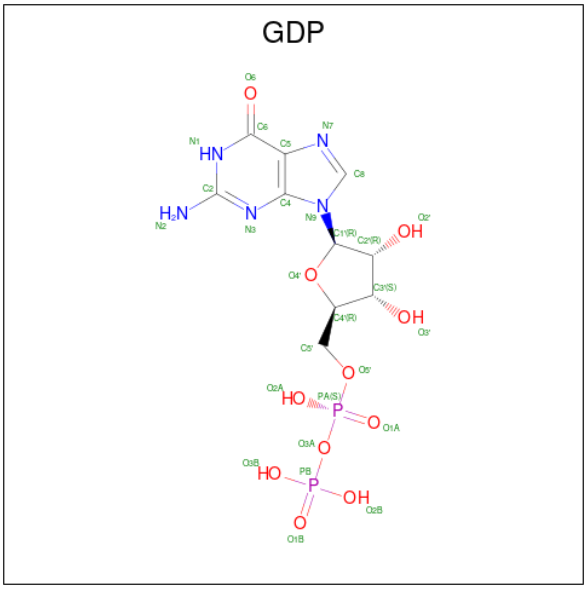
There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
0	705	GLY	-	expression tag	UNP P0A6M8
0	706	SER	-	expression tag	UNP P0A6M8
0	707	SER	-	expression tag	UNP P0A6M8
0	708	GLY	-	expression tag	UNP P0A6M8
0	709	HIS	-	expression tag	UNP P0A6M8
0	710	HIS	-	expression tag	UNP P0A6M8
0	711	HIS	-	expression tag	UNP P0A6M8
0	712	HIS	-	expression tag	UNP P0A6M8
0	713	HIS	-	expression tag	UNP P0A6M8
0	714	HIS	-	expression tag	UNP P0A6M8
0	715	HIS	-	expression tag	UNP P0A6M8
0	716	HIS	-	expression tag	UNP P0A6M8

- Molecule 66 is a protein (with D amino acids) called Viomycin.

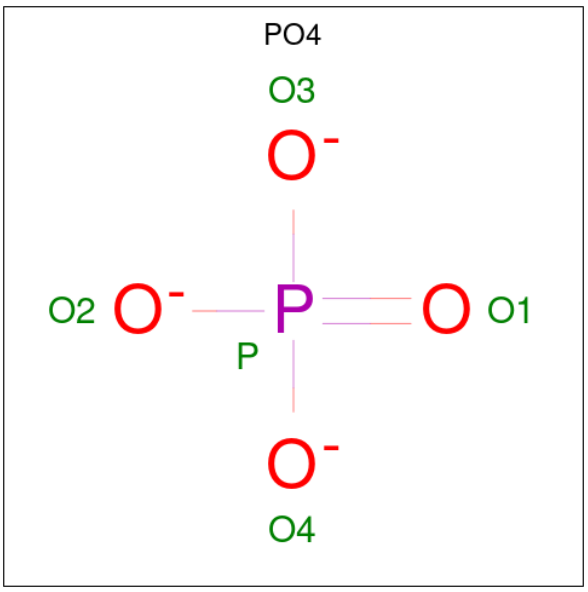
Mol	Chain	Residues	Atoms				AltConf	Trace
66	h	6	Total	C	N	O	0	0
			48	25	13	10		

- Molecule 67 is GUANOSINE-5'-DIPHOSPHATE (CCD ID: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).



Mol	Chain	Residues	Atoms					AltConf
67	0	1	Total	C	N	O	P	0
			28	10	5	11	2	

- Molecule 68 is PHOSPHATE ION (CCD ID: PO4) (formula: O_4P).



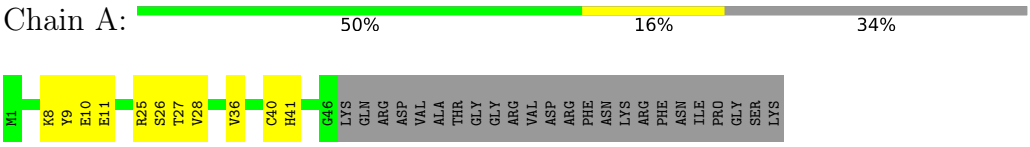
Mol	Chain	Residues	Atoms			AltConf
68	0	1	Total	O	P	0
			5	4	1	

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.

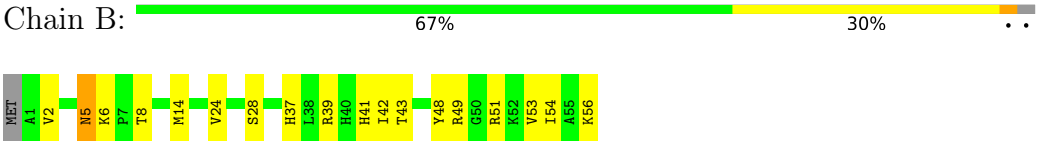
• Molecule 1: 50S ribosomal protein L31

Chain A:



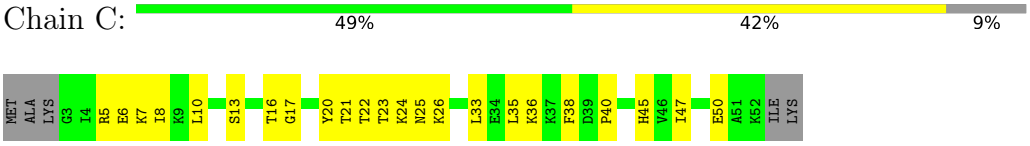
• Molecule 2: 50S ribosomal protein L32

Chain B:



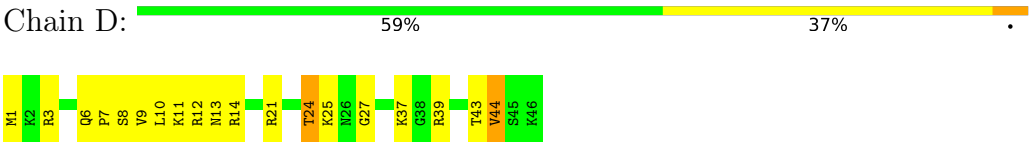
• Molecule 3: 50S ribosomal protein L33

Chain C:



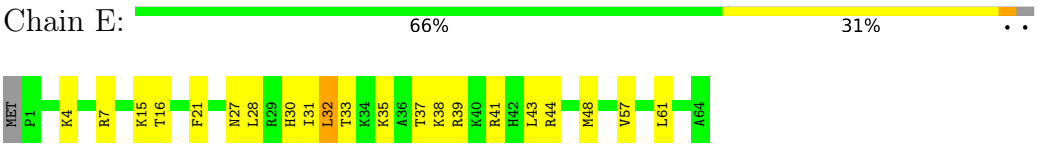
• Molecule 4: 50S ribosomal protein L34

Chain D:



• Molecule 5: 50S ribosomal protein L35

Chain E:

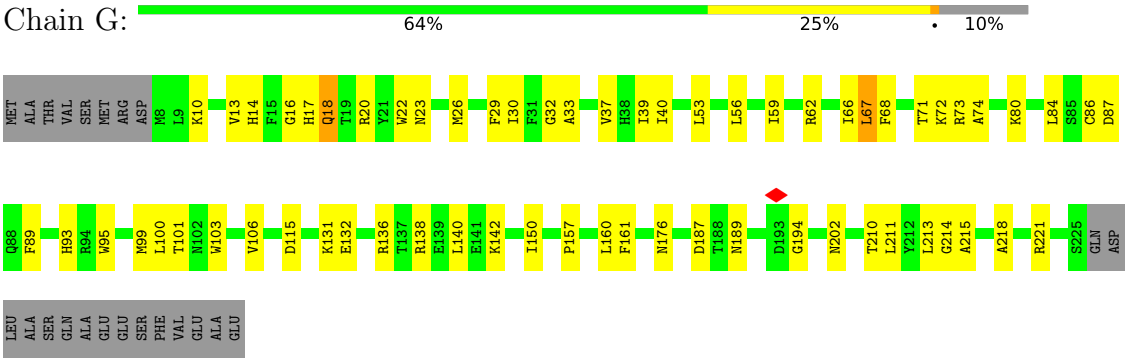


• Molecule 6: 50S ribosomal protein L36

Chain F:

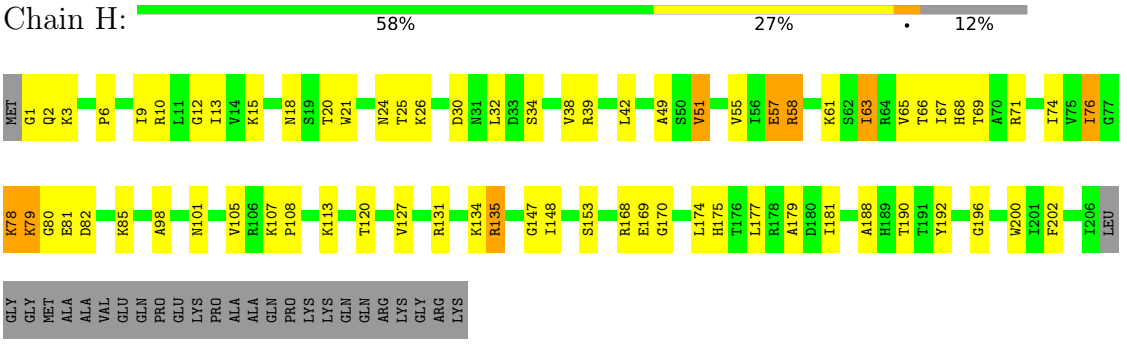
• Molecule 7: 30S ribosomal protein S2

Chain G:



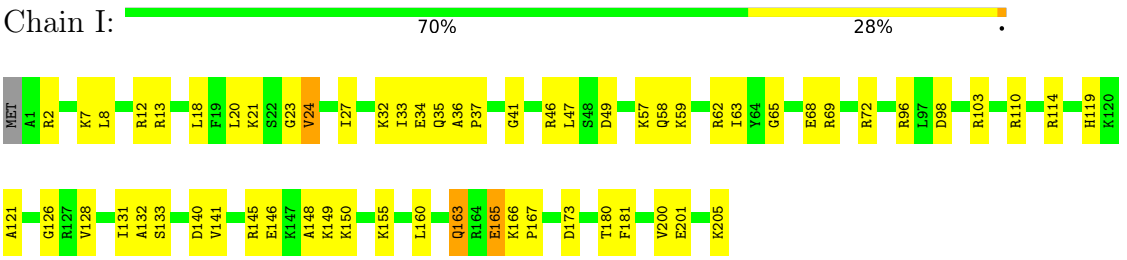
• Molecule 8: 30S ribosomal protein S3

Chain H:



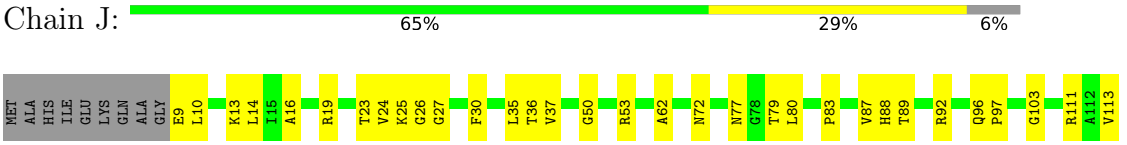
• Molecule 9: 30S ribosomal protein S4

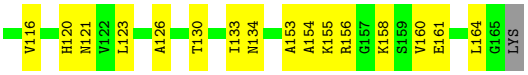
Chain I:



• Molecule 10: 30S ribosomal protein S5

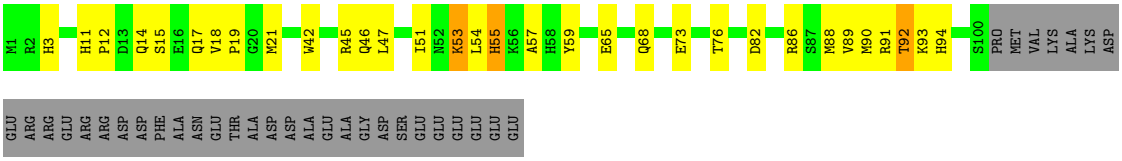
Chain J:





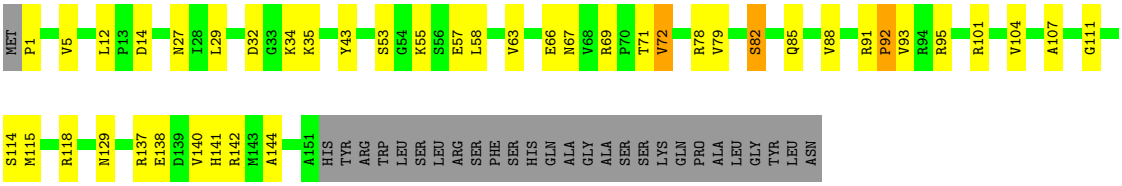
• Molecule 11: 30S ribosomal protein S6, fully modified isoform

Chain K:



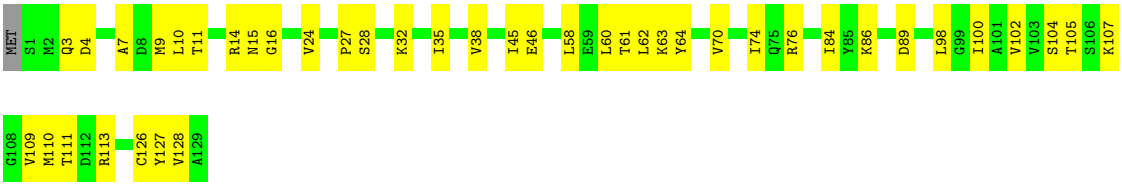
• Molecule 12: 30S ribosomal protein S7

Chain L:



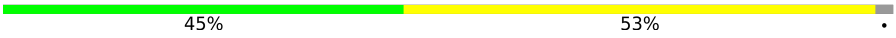
• Molecule 13: 30S ribosomal protein S8

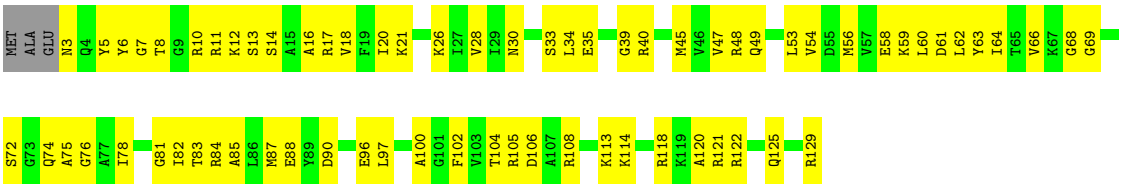
Chain M:



• Molecule 14: 30S ribosomal protein S9

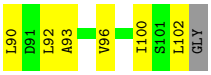
Chain N:





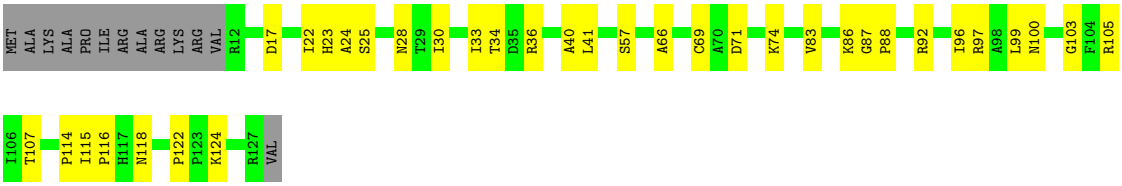
• Molecule 15: 30S ribosomal protein S10

Chain O:



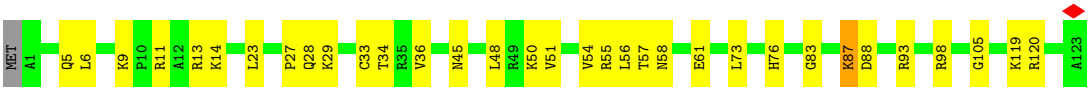
• Molecule 16: 30S ribosomal protein S11

Chain P:



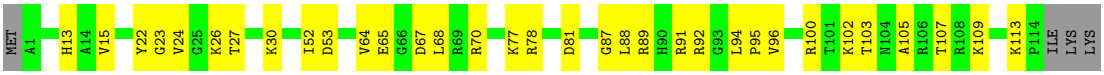
• Molecule 17: 30S ribosomal protein S12

Chain Q:



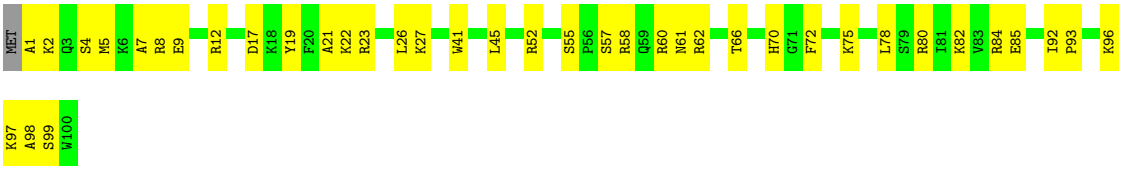
• Molecule 18: 30S ribosomal protein S13

Chain R:



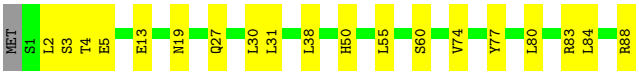
• Molecule 19: 30S ribosomal protein S14

Chain S:



• Molecule 20: 30S ribosomal protein S15

Chain T:



• Molecule 21: 30S ribosomal protein S16

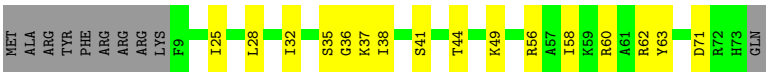
Chain U:

• Molecule 22: 30S ribosomal protein S17

Chain V:

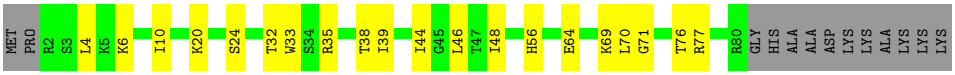
• Molecule 23: 30S ribosomal protein S18

Chain W:



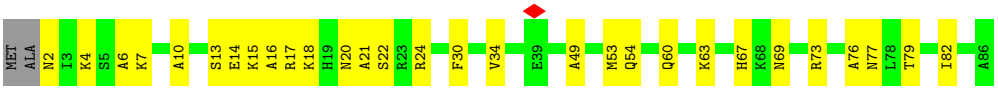
• Molecule 24: 30S ribosomal protein S19

Chain X:



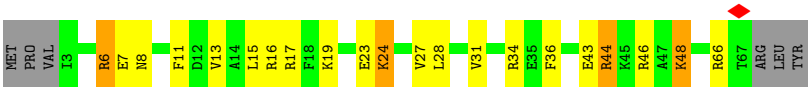
• Molecule 25: 30S ribosomal protein S20

Chain Y:



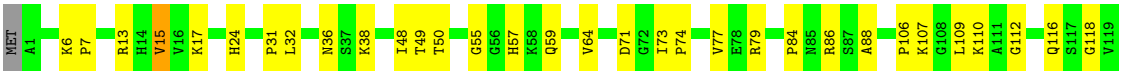
• Molecule 26: 30S ribosomal protein S21

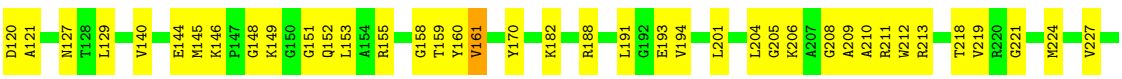
Chain Z:

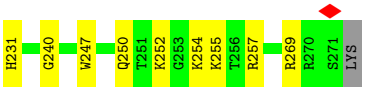


• Molecule 27: 50S ribosomal protein L2

Chain b:

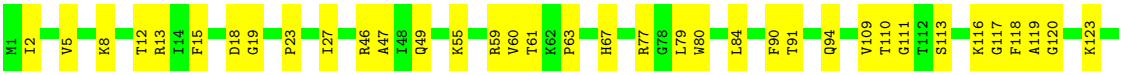






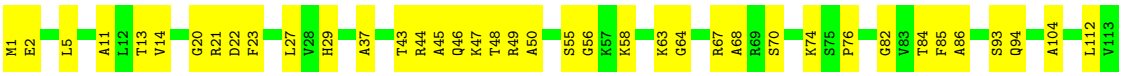
• Molecule 28: 50S ribosomal protein L3

Chain c:



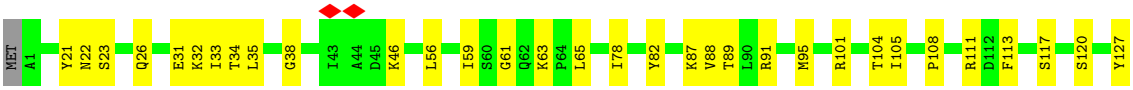
• Molecule 29: 50S ribosomal protein L4

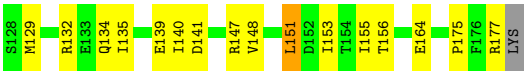
Chain d:



• Molecule 30: 50S ribosomal protein L5

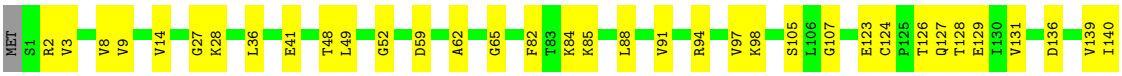
Chain e:





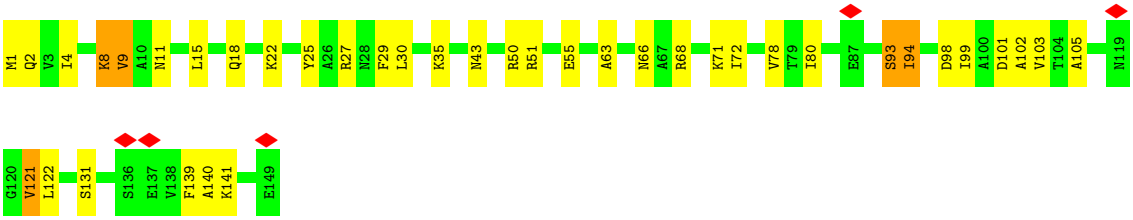
• Molecule 31: 50S ribosomal protein L6

Chain f:

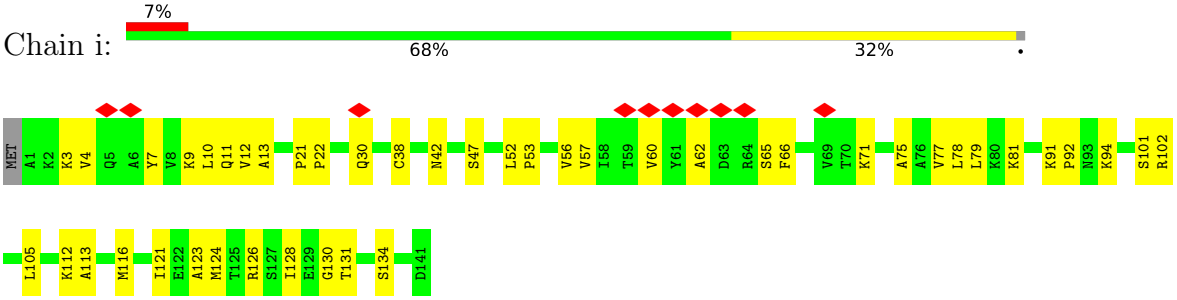


• Molecule 32: 50S ribosomal protein L9

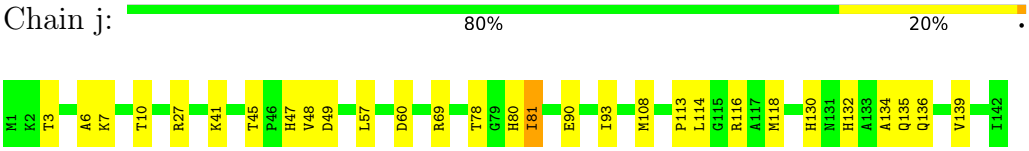
Chain g:



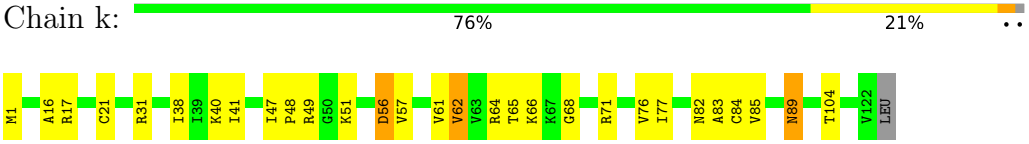
• Molecule 33: 50S ribosomal protein L11



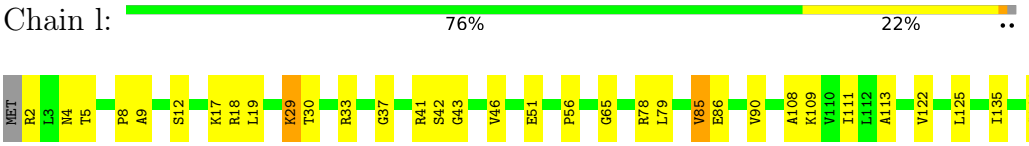
• Molecule 34: 50S ribosomal protein L13



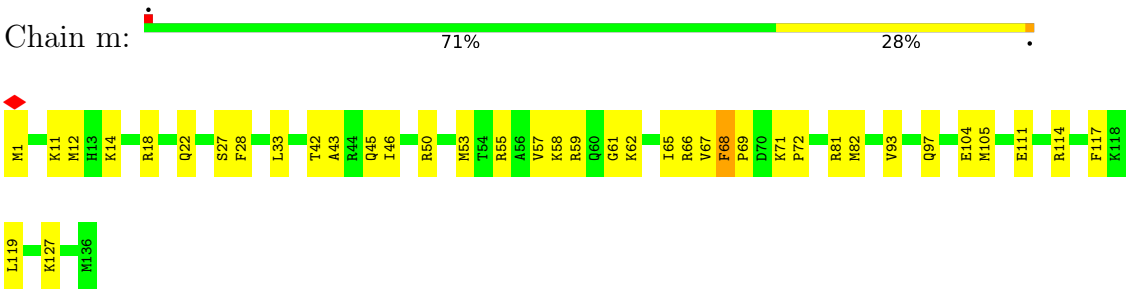
• Molecule 35: 50S ribosomal protein L14



• Molecule 36: 50S ribosomal protein L15

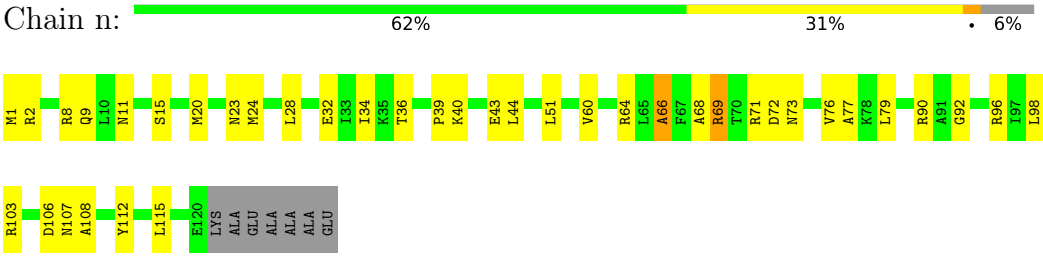


• Molecule 37: 50S ribosomal protein L16



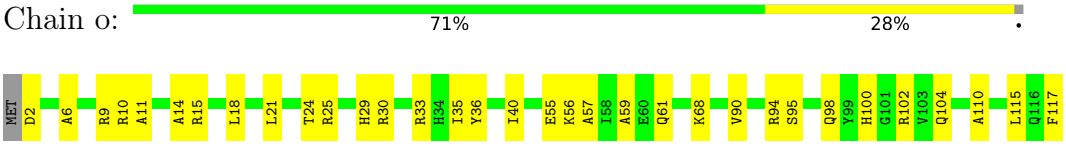
• Molecule 38: 50S ribosomal protein L17

Chain n:



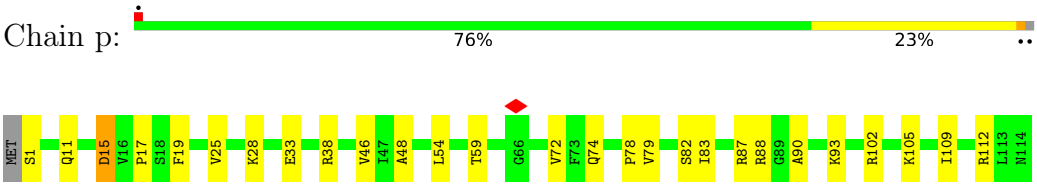
• Molecule 39: 50S ribosomal protein L18

Chain o:



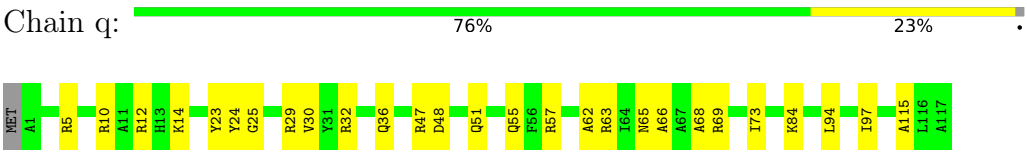
• Molecule 40: 50S ribosomal protein L19

Chain p:



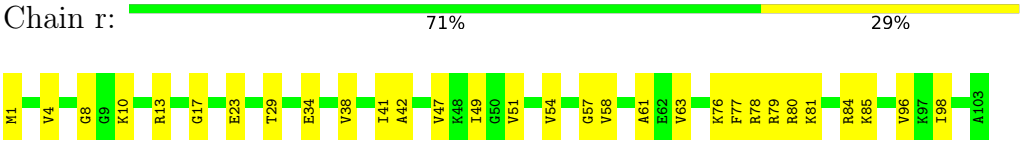
• Molecule 41: 50S ribosomal protein L20

Chain q:



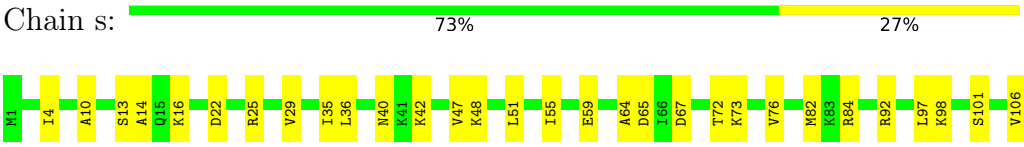
• Molecule 42: 50S ribosomal protein L21

Chain r:



• Molecule 43: 50S ribosomal protein L22

Chain s:



• Molecule 44: 50S ribosomal protein L23

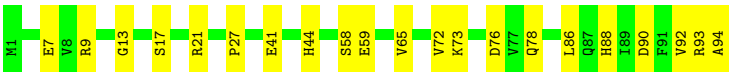
Chain t:

• Molecule 45: 50S ribosomal protein L24

Chain u:

• Molecule 46: 50S ribosomal protein L25

Chain v:

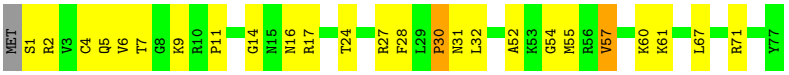


• Molecule 47: 50S ribosomal protein L27

Chain w:

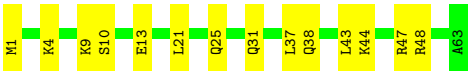
• Molecule 48: 50S ribosomal protein L28

Chain x:



• Molecule 49: 50S ribosomal protein L29

Chain y:

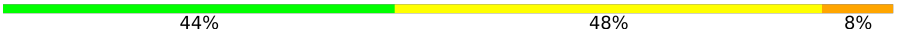


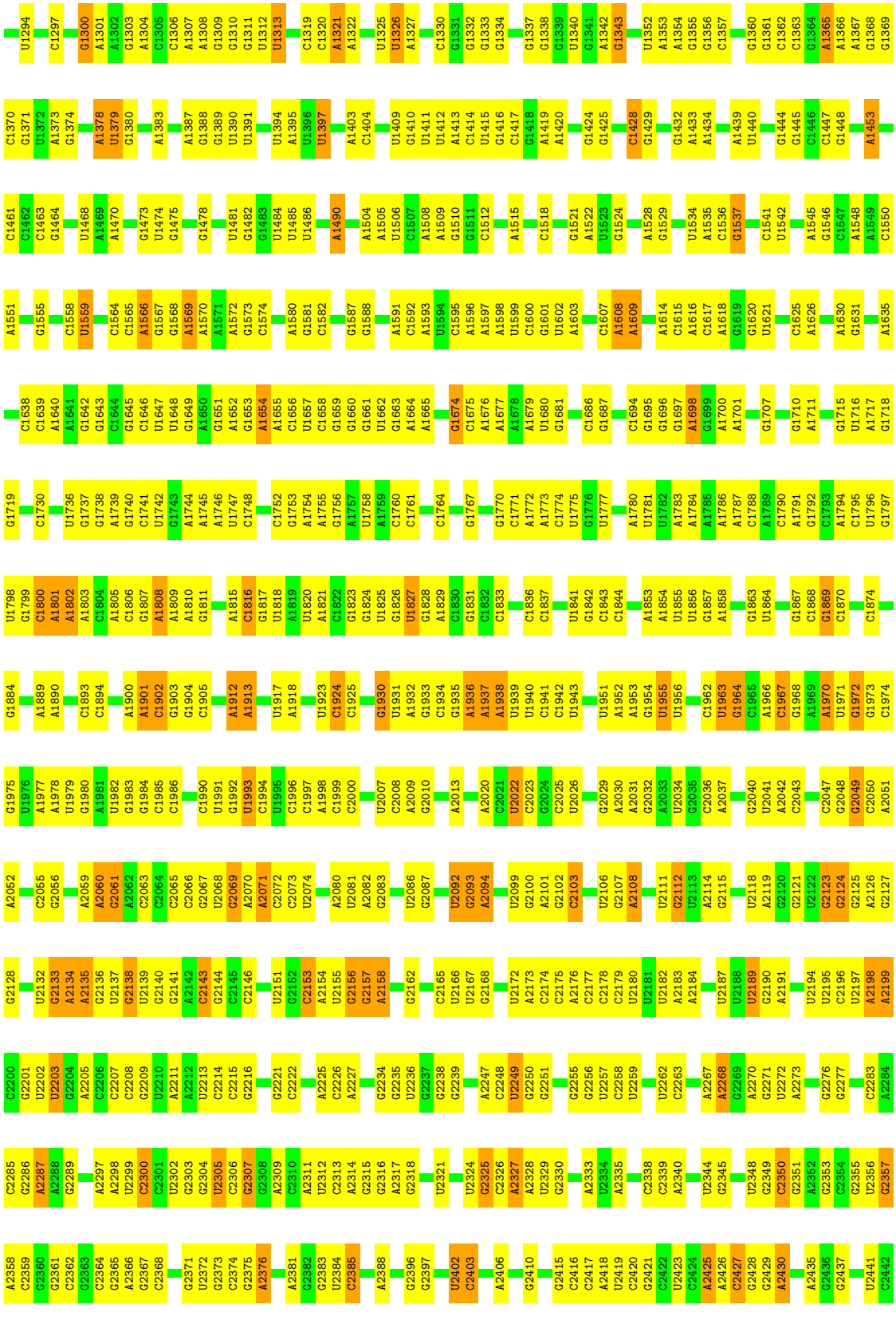
• Molecule 50: 50S ribosomal protein L30

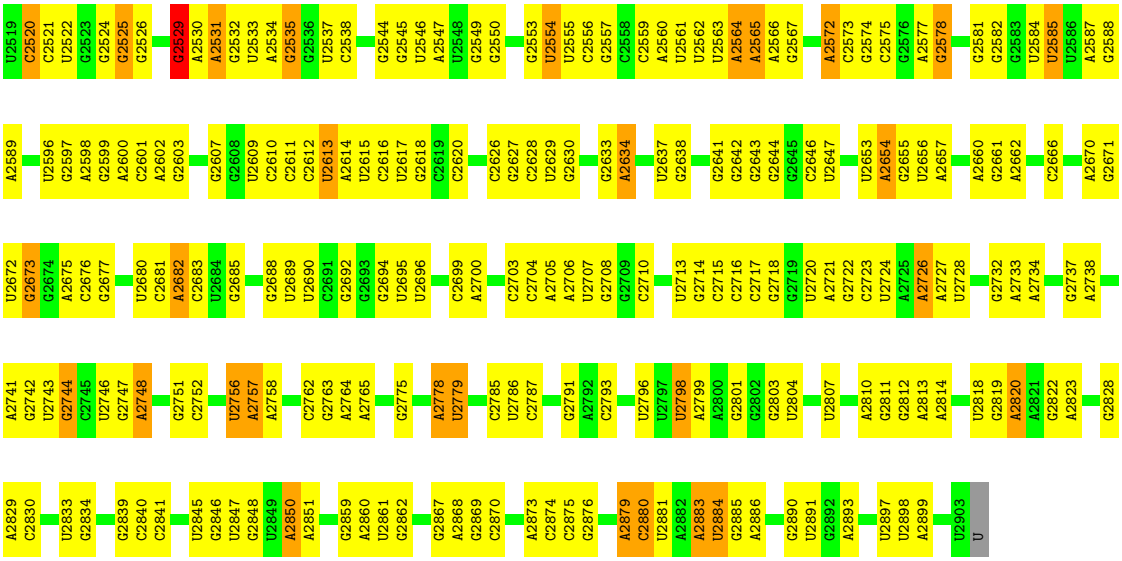
Chain z:

• Molecule 51: 23S rRNA

Chain 1:





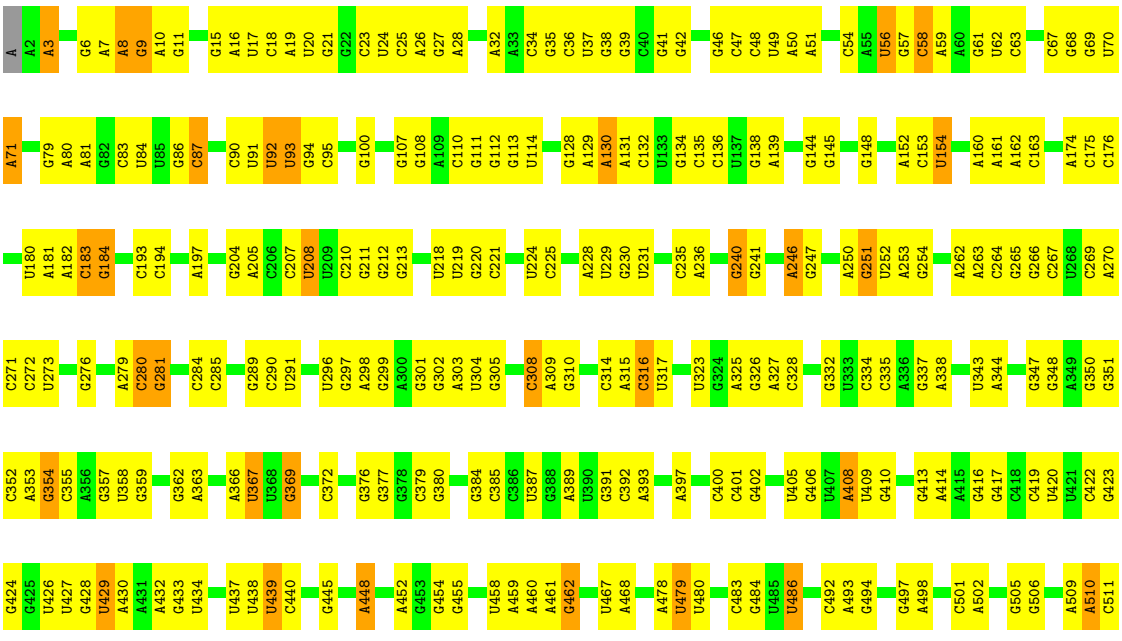


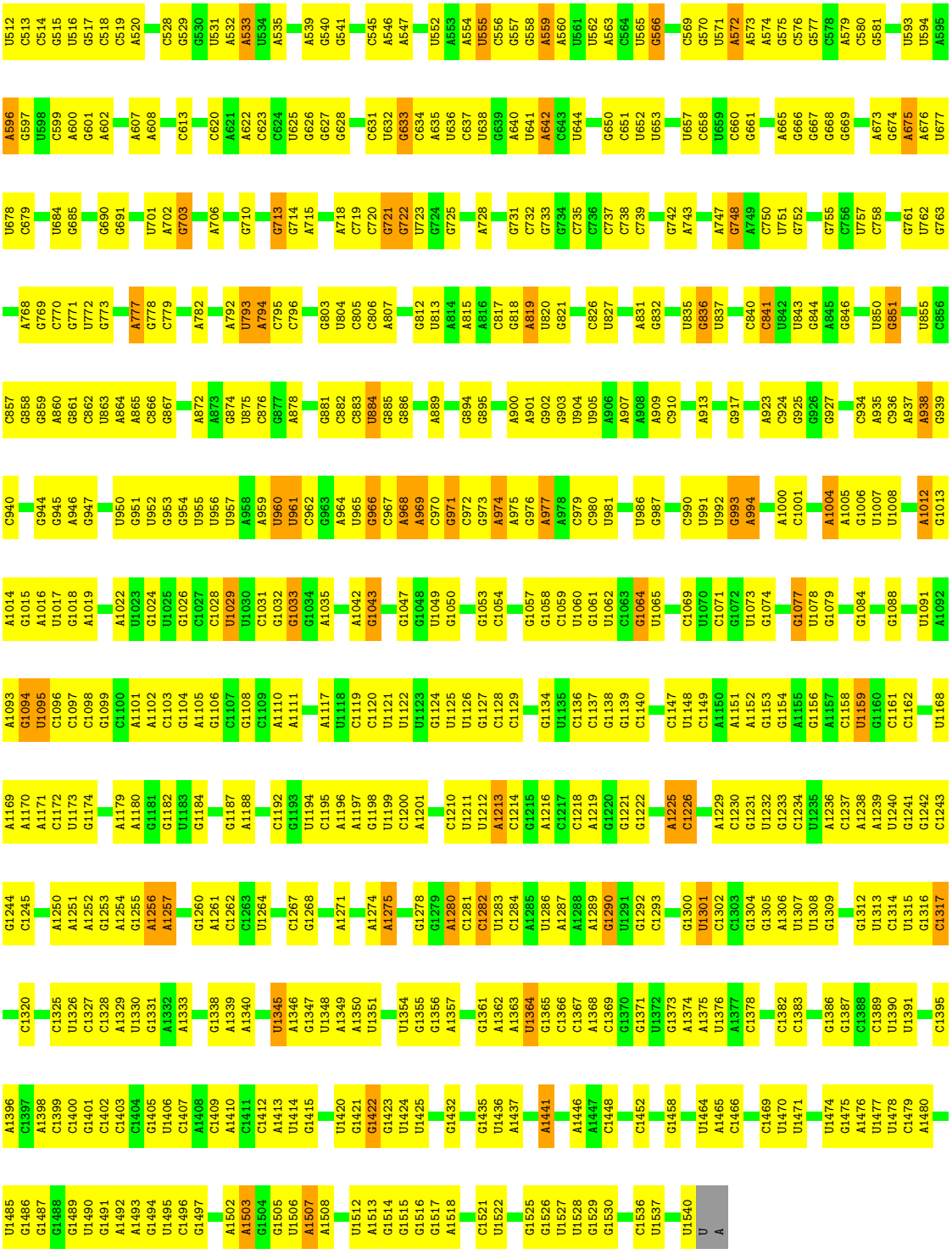
• Molecule 52: 5S rRNA

Chain 2:

• Molecule 53: 16S rRNA

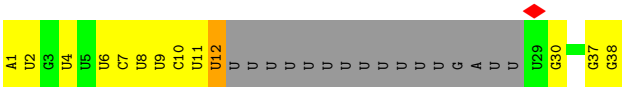
Chain 3:





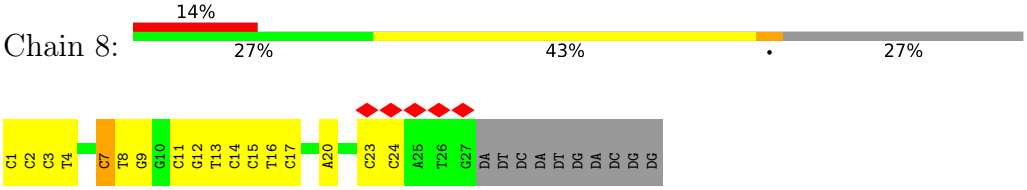
• Molecule 54: mRNA

Chain 4:



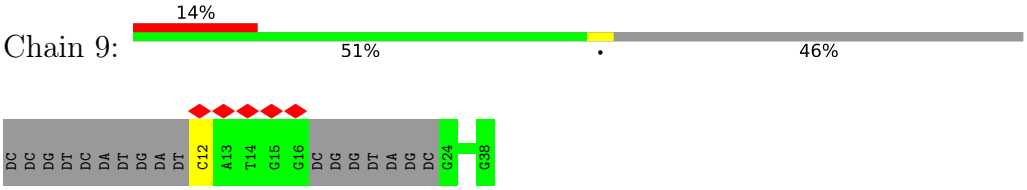
• Molecule 55: templete DNA strand

Chain 8:



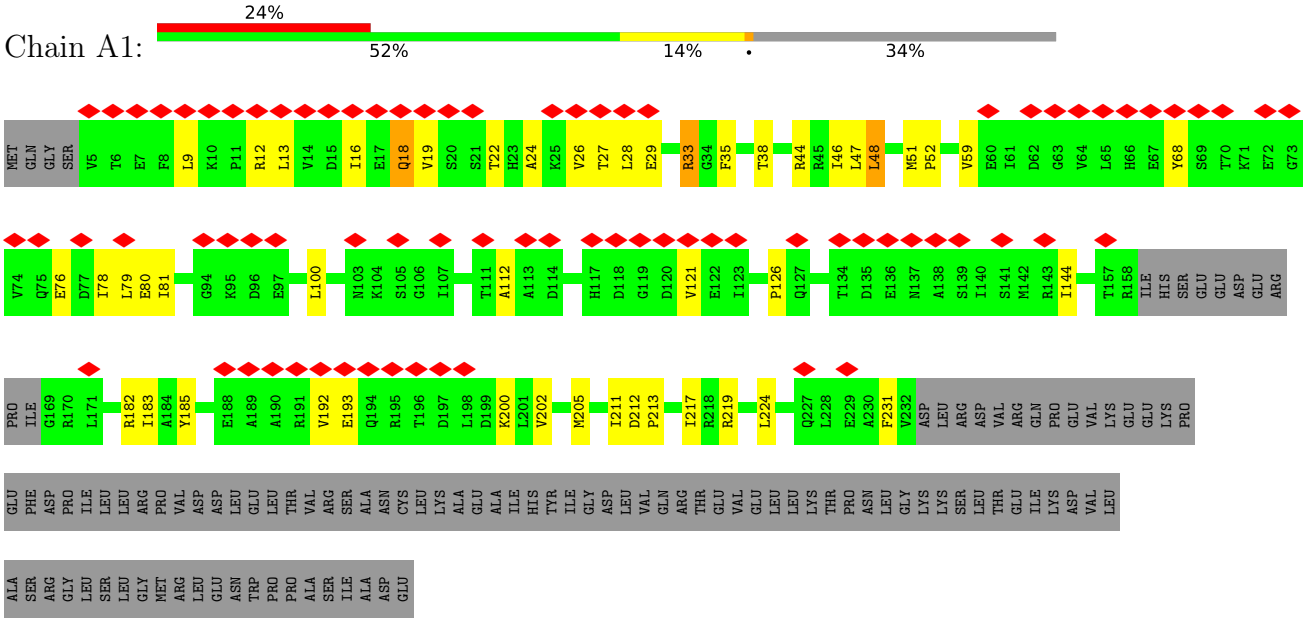
• Molecule 56: non-templete DNA strand

Chain 9:



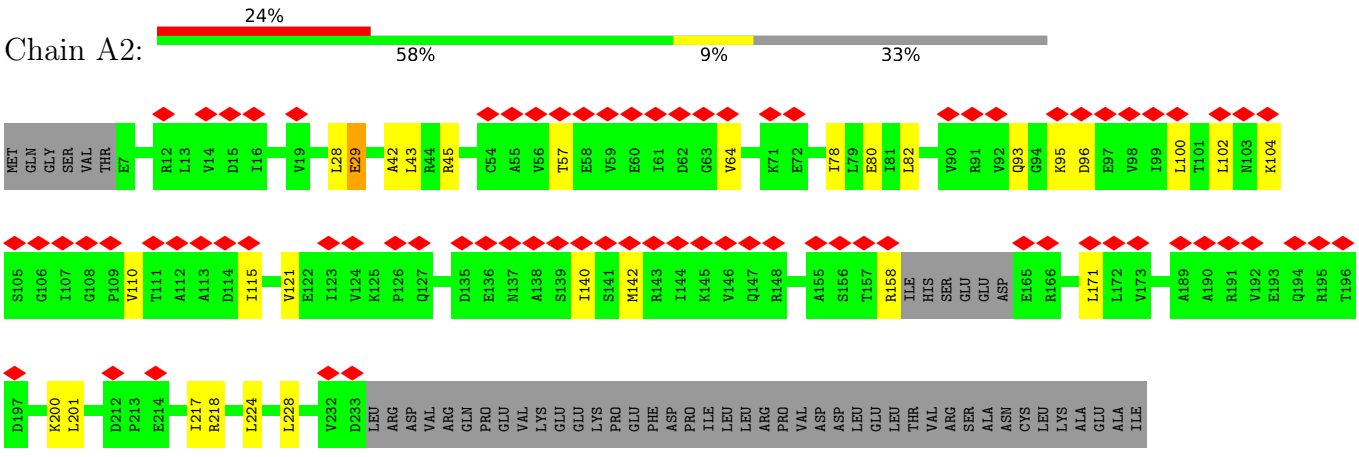
• Molecule 57: DNA-directed RNA polymerase subunit alpha

Chain A1:



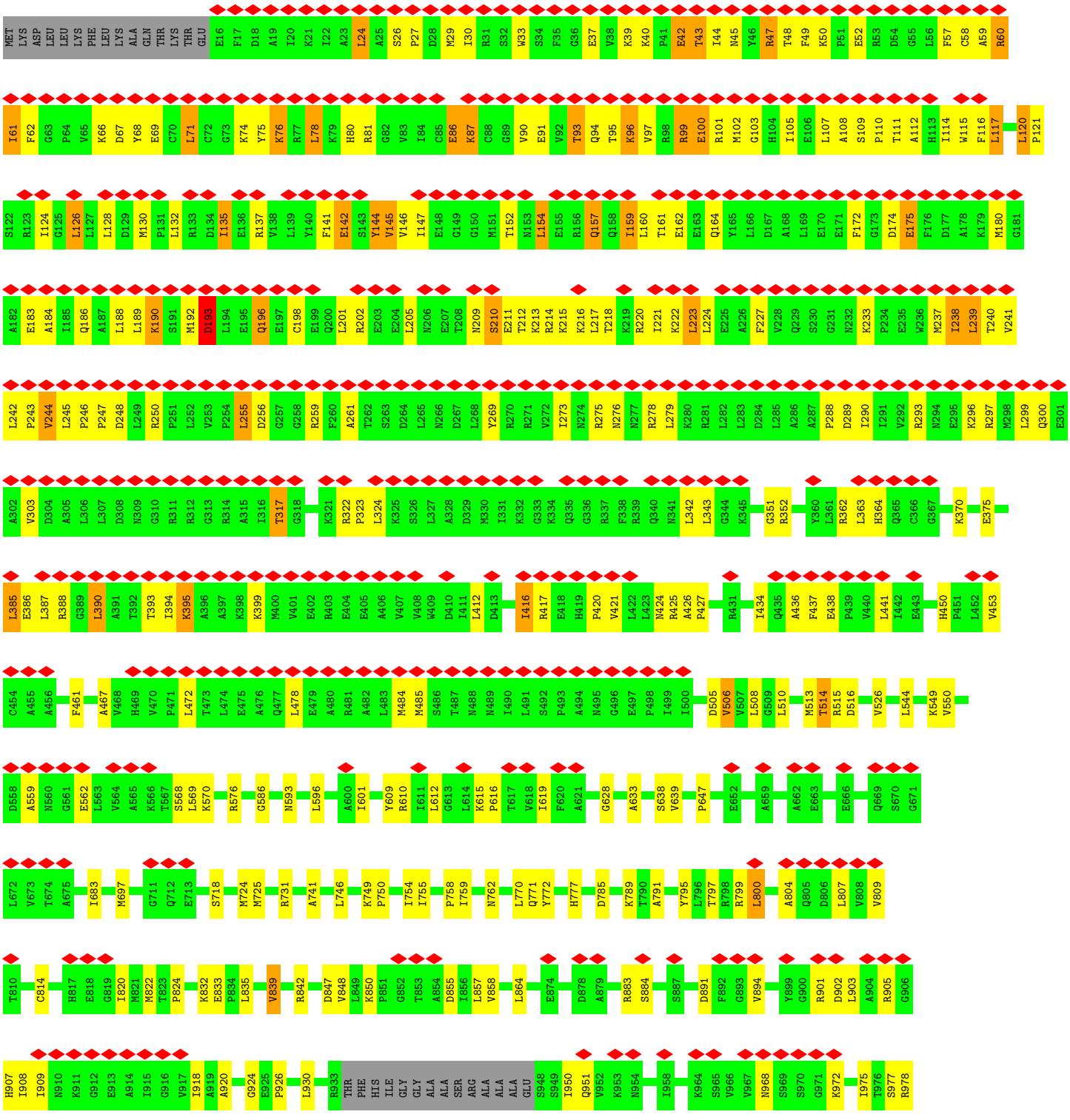
• Molecule 57: DNA-directed RNA polymerase subunit alpha

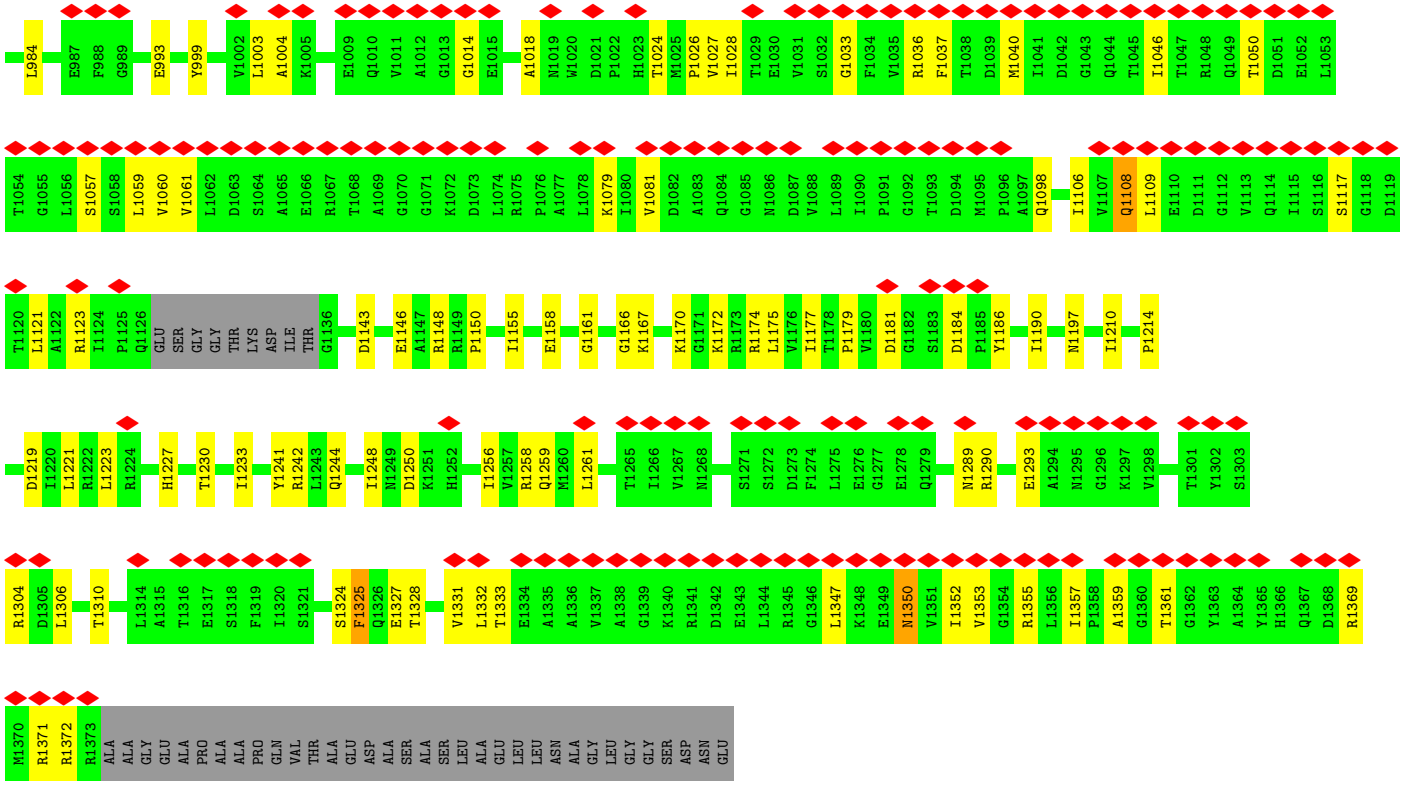
Chain A2:



• Molecule 58: DNA-directed RNA polymerase subunit beta'

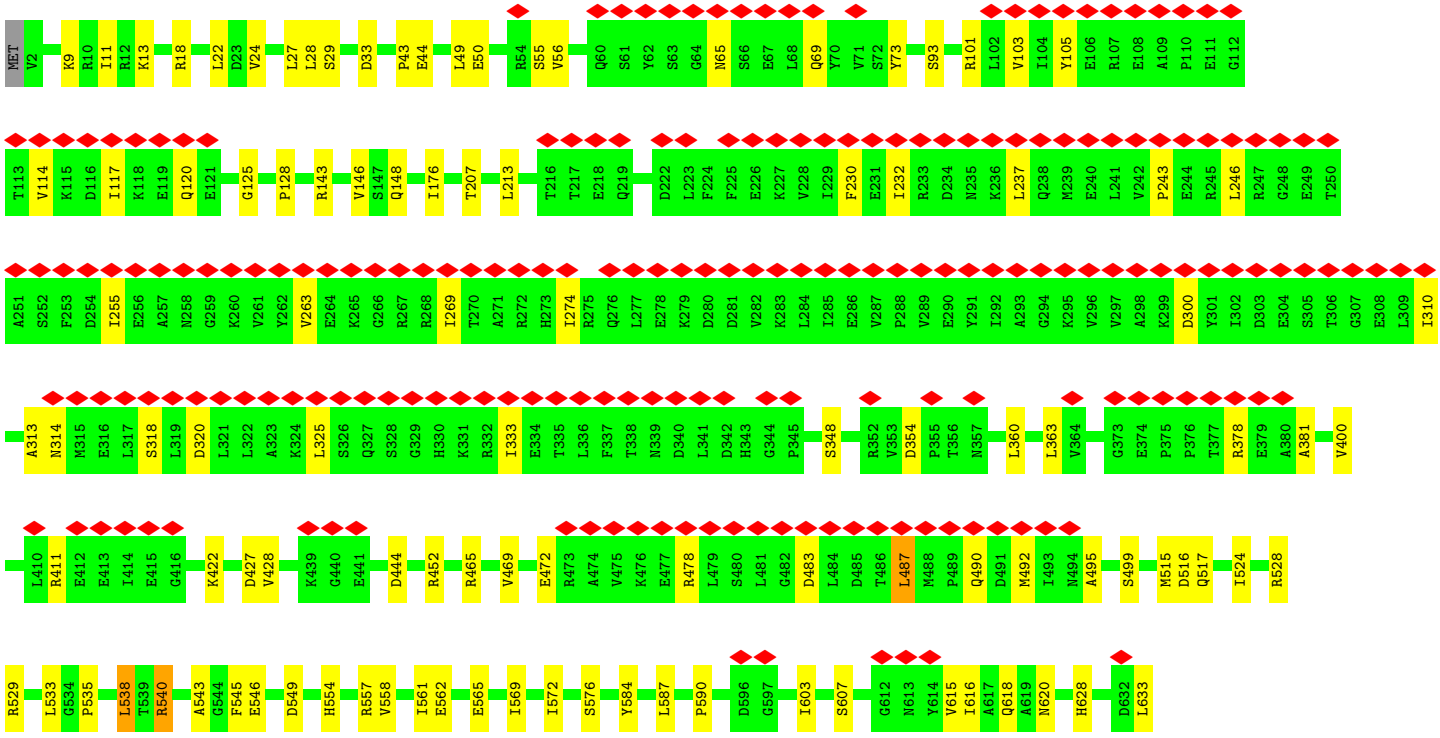
Chain B1:

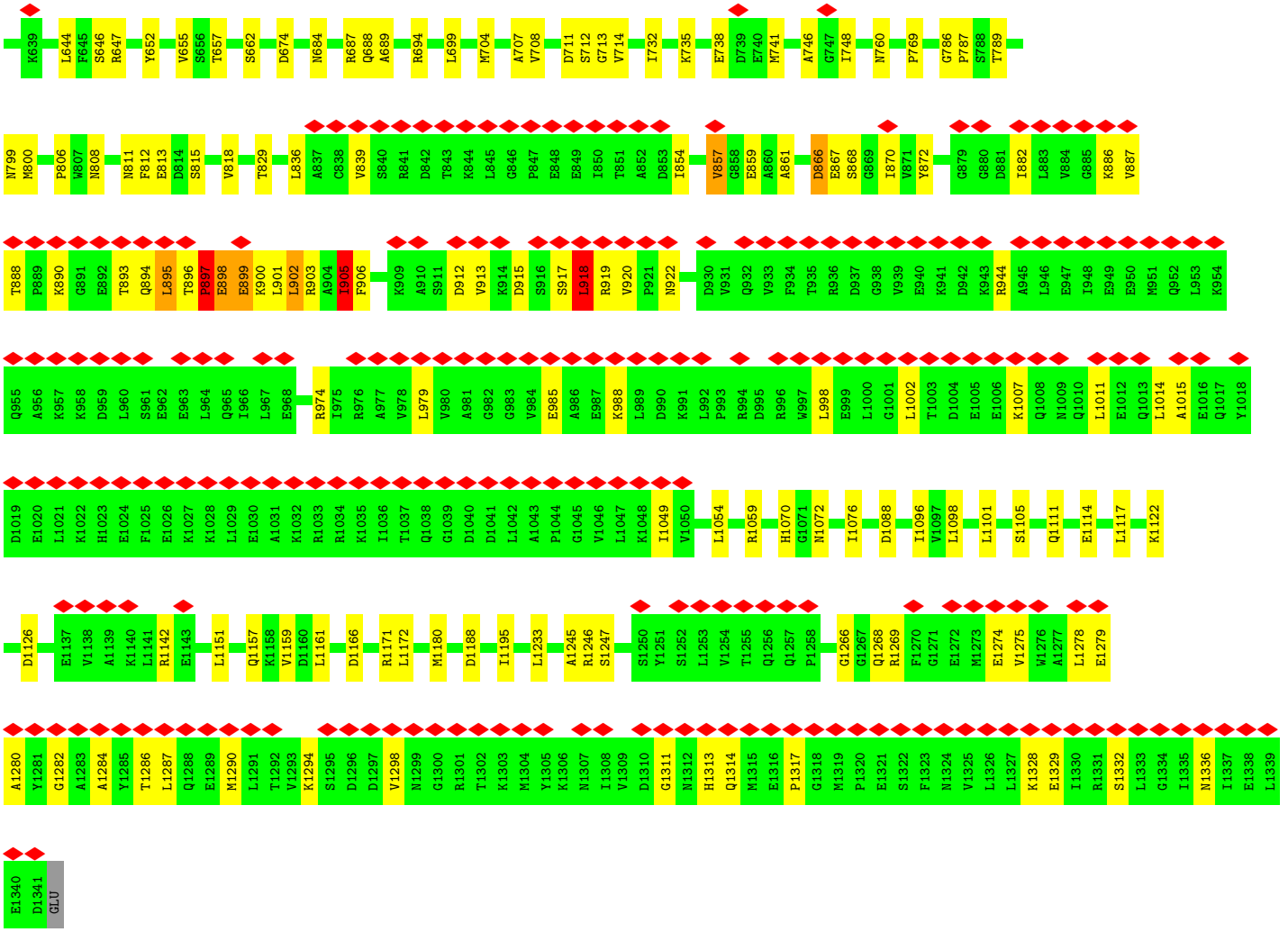




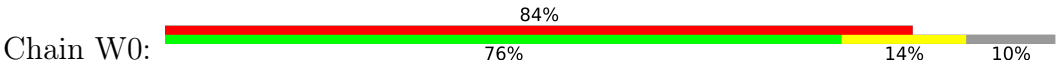
• Molecule 59: DNA-directed RNA polymerase subunit beta

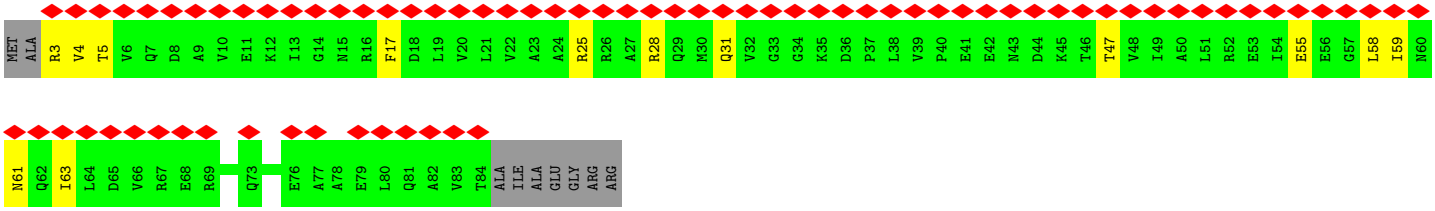
Chain B2:



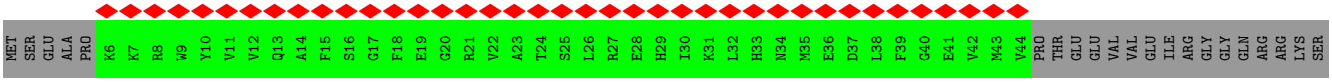


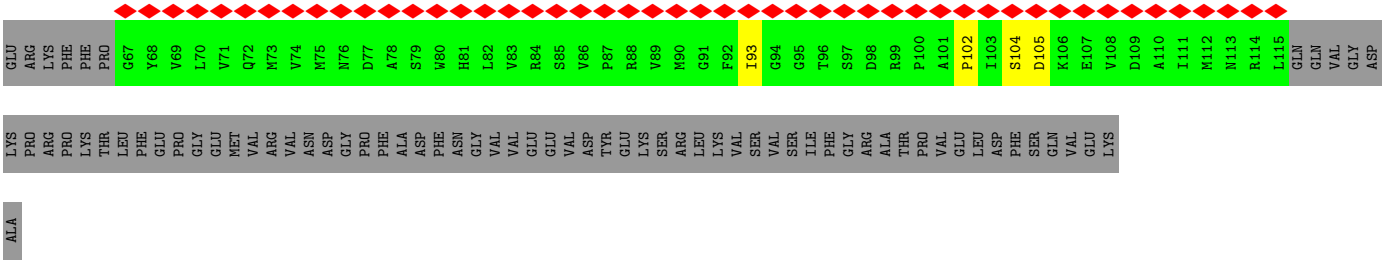
• Molecule 60: DNA-directed RNA polymerase subunit omega





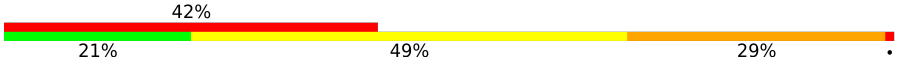
• Molecule 61: Transcription termination/antitermination protein NusG

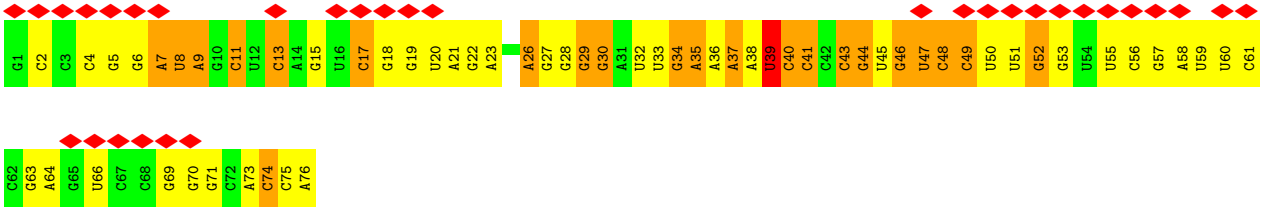




• Molecule 62: tRNA(Phe)

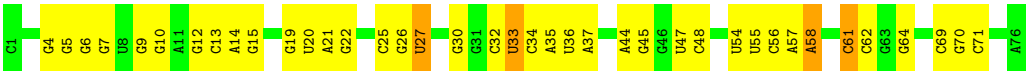
Chain 5:





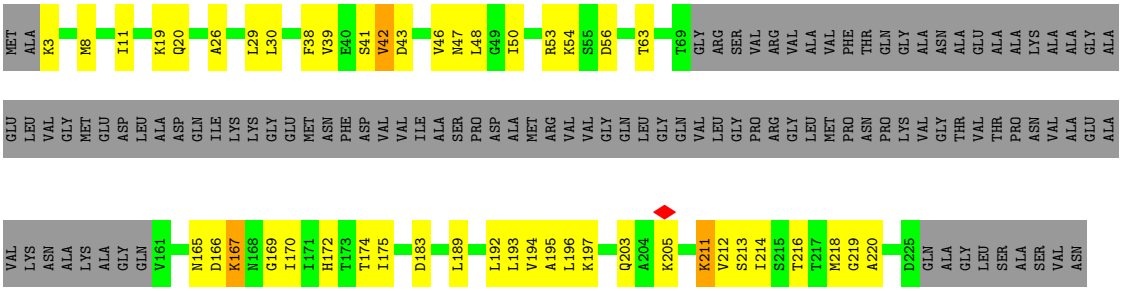
• Molecule 63: tRNA(fMet)

Chain 6:



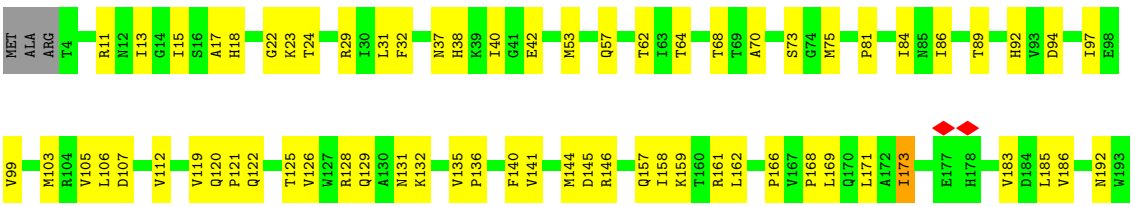
• Molecule 64: Large ribosomal subunit protein uL1

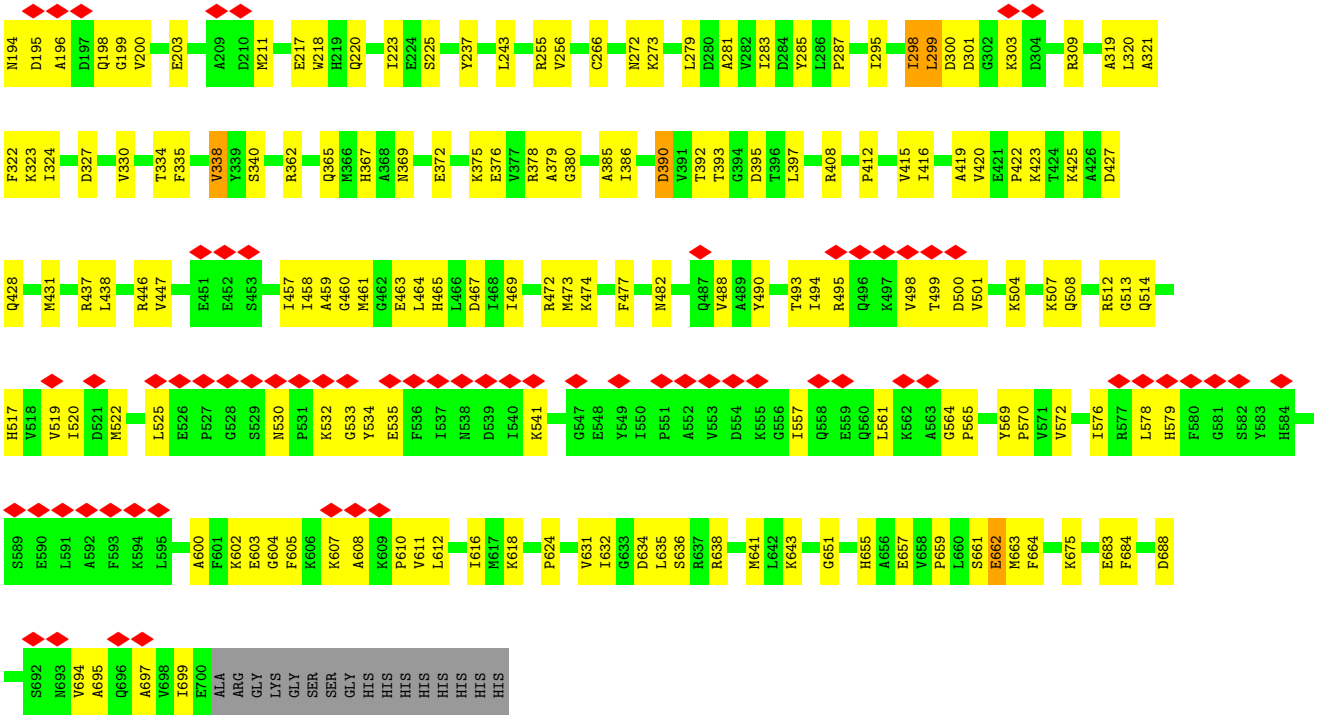
Chain a:



• Molecule 65: Elongation factor G

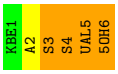
Chain 0:





- Molecule 66: Viomycin

Chain h:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	35002	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TALOS ARCTICA	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/Å^2$)	47	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	1500	Depositor
Magnification	Not provided	
Image detector	FEI FALCON III (4k x 4k)	Depositor
Maximum map value	0.088	Depositor
Minimum map value	-0.031	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.004	Depositor
Recommended contour level	0.006	Depositor
Map size (Å)	753.60004, 753.60004, 753.60004	wwPDB
Map dimensions	480, 480, 480	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.57, 1.57, 1.57	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GDP, KBE, 5OH, PO4, DPP, UAL

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	A	0.25	0/362	0.72	0/485
2	B	0.37	0/450	0.80	2/599 (0.3%)
3	C	0.32	0/416	0.61	0/554
4	D	0.47	0/380	0.95	0/498
5	E	0.46	0/513	0.80	0/676
6	F	0.41	0/303	0.79	0/397
7	G	0.39	0/1735	0.83	0/2338
8	H	0.47	0/1651	0.83	0/2225
9	I	0.32	0/1659	0.77	1/2220 (0.0%)
10	J	0.47	0/1169	0.81	0/1573
11	K	0.44	0/835	0.86	0/1128
12	L	0.41	0/1195	0.82	2/1602 (0.1%)
13	M	0.31	0/989	0.75	0/1326
14	N	0.29	0/1034	0.74	0/1375
15	O	0.59	0/796	0.86	0/1077
16	P	0.42	0/885	0.76	0/1195
17	Q	0.43	0/969	0.80	0/1300
18	R	0.29	0/892	0.68	0/1193
19	S	0.28	0/817	0.68	1/1088 (0.1%)
20	T	0.37	0/722	0.74	0/964
21	U	0.30	0/659	0.64	0/884
22	V	0.33	0/657	0.72	0/881
23	W	0.28	0/544	0.69	0/731
24	X	0.28	0/652	0.64	0/877
25	Y	0.26	0/671	0.64	2/888 (0.2%)
26	Z	0.56	0/550	1.09	1/728 (0.1%)
27	b	0.49	0/2121	0.82	0/2852
28	c	0.45	0/1586	0.77	0/2134
29	d	0.40	0/1571	0.80	3/2113 (0.1%)
30	e	0.30	0/1434	0.66	0/1926
31	f	0.29	0/1343	0.61	0/1816
32	g	0.34	0/1122	0.77	3/1515 (0.2%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#|Z| >5	RMSZ	#|Z| >5
33	i	0.39	0/1046	0.80	1/1410 (0.1%)
34	j	0.46	0/1152	0.72	0/1551
35	k	0.42	0/947	0.91	1/1268 (0.1%)
36	l	0.41	0/1054	0.80	2/1403 (0.1%)
37	m	0.40	0/1093	0.81	2/1460 (0.1%)
38	n	0.54	1/973 (0.1%)	0.87	0/1301
39	o	0.32	0/902	0.68	0/1209
40	p	0.39	0/929	0.72	2/1242 (0.2%)
41	q	0.43	0/960	0.72	0/1278
42	r	0.38	0/829	0.78	1/1107 (0.1%)
43	s	0.52	0/864	0.83	0/1156
44	t	0.48	0/744	0.81	1/994 (0.1%)
45	u	0.33	0/787	0.74	2/1051 (0.2%)
46	v	0.35	0/766	0.66	0/1025
47	w	0.40	0/582	0.80	2/769 (0.3%)
48	x	0.62	0/635	1.16	5/848 (0.6%)
49	y	0.28	0/510	0.71	0/677
50	z	0.36	0/453	0.76	1/605 (0.2%)
51	1	0.59	0/69796	0.60	17/108888 (0.0%)
52	2	0.60	0/2872	0.55	1/4479 (0.0%)
53	3	0.60	0/36963	0.57	5/57662 (0.0%)
54	4	0.57	0/519	0.69	0/804
55	8	0.56	0/599	0.71	1/919 (0.1%)
56	9	0.48	0/468	0.53	0/719
57	A1	0.48	0/1696	0.69	0/2298
57	A2	0.47	0/1718	0.67	0/2328
58	B1	0.56	4/10510 (0.0%)	0.74	8/14196 (0.1%)
59	B2	0.46	0/10714	0.68	2/14459 (0.0%)
60	W0	0.30	0/652	0.61	0/879
61	NG	0.56	0/431	0.79	0/596
62	5	0.58	0/1812	0.90	3/2823 (0.1%)
63	6	0.59	0/1832	0.59	0/2855
64	a	0.49	0/1020	0.81	0/1370
65	0	0.39	0/5501	0.72	3/7446 (0.0%)
66	h	3.21	2/11 (18.2%)	0.75	0/13
All	All	0.53	7/193022 (0.0%)	0.66	75/284246 (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
8	H	0	1

The worst 5 of 7 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
66	h	3	SER	CA-C	-6.76	1.38	1.52
66	h	4	SER	CA-C	-6.29	1.39	1.52
38	n	66	ALA	CA-C	-5.95	1.44	1.52
58	B1	1350	ASN	CG-ND2	-5.26	1.22	1.33
58	B1	424	ASN	CG-ND2	-5.18	1.22	1.33

The worst 5 of 75 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
12	L	92	PRO	N-CA-C	-10.49	98.47	113.47
51	1	1020	A	C2'-C3'-O3'	7.36	120.54	109.50
48	x	11	PRO	N-CA-C	-7.33	99.53	111.77
51	1	2425	A	O3'-P-O5'	-6.94	93.58	104.00
12	L	82	SER	N-CA-C	6.90	116.42	108.49

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
8	H	71	ARG	Sidechain

5.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	355	0	353	10	0
2	B	444	0	461	15	0
3	C	409	0	440	19	0
4	D	377	0	418	17	0
5	E	504	0	574	15	0
6	F	302	0	341	14	0
7	G	1704	0	1732	43	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
8	H	1624	0	1699	55	0
9	I	1637	0	1699	48	0
10	J	1156	0	1199	40	0
11	K	817	0	808	23	0
12	L	1181	0	1240	43	0
13	M	979	0	1034	32	0
14	N	1022	0	1070	56	0
15	O	786	0	828	33	0
16	P	869	0	878	27	0
17	Q	955	0	1019	32	0
18	R	883	0	944	25	0
19	S	805	0	847	34	0
20	T	714	0	737	17	0
21	U	649	0	666	21	0
22	V	648	0	691	17	0
23	W	535	0	552	16	0
24	X	637	0	665	17	0
25	Y	665	0	714	21	0
26	Z	544	0	579	15	0
27	b	2082	0	2157	72	0
28	c	1565	0	1616	55	0
29	d	1552	0	1619	51	0
30	e	1410	0	1447	40	0
31	f	1323	0	1374	31	0
32	g	1111	0	1148	28	0
33	i	1032	0	1088	35	0
34	j	1129	0	1162	30	0
35	k	938	0	1012	22	0
36	l	1045	0	1117	29	0
37	m	1074	0	1157	29	0
38	n	960	0	1000	35	0
39	o	892	0	923	21	0
40	p	917	0	965	24	0
41	q	947	0	1022	24	0
42	r	816	0	839	22	0
43	s	857	0	922	18	0
44	t	738	0	807	15	0
45	u	779	0	834	18	0
46	v	753	0	780	14	0
47	w	575	0	592	20	0
48	x	625	0	655	22	0
49	y	509	0	543	9	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
50	z	449	0	491	10	0
51	1	62317	0	31346	1367	0
52	2	2568	0	1303	59	0
53	3	33012	0	16618	727	0
54	4	467	0	234	5	0
55	8	539	0	305	28	0
56	9	417	0	224	1	0
57	A1	1677	0	1713	27	0
57	A2	1698	0	1718	17	0
58	B1	10353	0	10548	321	0
59	B2	10546	0	10550	173	0
60	W0	650	0	658	10	0
61	NG	433	0	193	8	0
62	5	1622	0	821	28	0
63	6	1640	0	837	28	0
64	a	1013	0	1081	38	0
65	0	5399	0	5363	151	0
66	h	48	0	40	8	0
67	0	28	0	12	1	0
68	0	5	0	0	0	0
All	All	179711	0	131022	3773	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 12.

The worst 5 of 3773 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
12:L:92:PRO:HA	12:L:95:ARG:HE	1.12	1.12
51:1:1060:U:H4'	51:1:1061:U:H5'	1.32	1.11
53:3:112:G:H21	53:3:354:G:H5'	1.16	1.10
51:1:2061:G:H2'	51:1:2501:C:O2'	1.52	1.09
50:z:37:ARG:HH12	51:1:929:U:H5'	1.12	1.06

There are no symmetry-related clashes.

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	A	44/70 (63%)	38 (86%)	6 (14%)	0	100	100
2	B	54/57 (95%)	48 (89%)	6 (11%)	0	100	100
3	C	48/55 (87%)	37 (77%)	11 (23%)	0	100	100
4	D	44/46 (96%)	35 (80%)	9 (20%)	0	100	100
5	E	62/65 (95%)	48 (77%)	13 (21%)	1 (2%)	7	37
6	F	36/38 (95%)	29 (81%)	7 (19%)	0	100	100
7	G	216/241 (90%)	182 (84%)	34 (16%)	0	100	100
8	H	204/233 (88%)	186 (91%)	18 (9%)	0	100	100
9	I	203/206 (98%)	171 (84%)	31 (15%)	1 (0%)	24	63
10	J	155/167 (93%)	129 (83%)	26 (17%)	0	100	100
11	K	98/135 (73%)	81 (83%)	17 (17%)	0	100	100
12	L	149/179 (83%)	130 (87%)	19 (13%)	0	100	100
13	M	127/130 (98%)	110 (87%)	17 (13%)	0	100	100
14	N	125/130 (96%)	110 (88%)	15 (12%)	0	100	100
15	O	96/103 (93%)	81 (84%)	15 (16%)	0	100	100
16	P	114/129 (88%)	104 (91%)	10 (9%)	0	100	100
17	Q	121/124 (98%)	97 (80%)	23 (19%)	1 (1%)	16	53
18	R	112/118 (95%)	99 (88%)	13 (12%)	0	100	100
19	S	98/101 (97%)	86 (88%)	12 (12%)	0	100	100
20	T	86/89 (97%)	80 (93%)	6 (7%)	0	100	100
21	U	80/82 (98%)	69 (86%)	11 (14%)	0	100	100
22	V	78/84 (93%)	69 (88%)	9 (12%)	0	100	100
23	W	63/75 (84%)	59 (94%)	4 (6%)	0	100	100
24	X	77/92 (84%)	69 (90%)	8 (10%)	0	100	100
25	Y	83/87 (95%)	77 (93%)	6 (7%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
26	Z	63/71 (89%)	47 (75%)	16 (25%)	0	100	100
27	b	269/273 (98%)	227 (84%)	42 (16%)	0	100	100
28	c	207/209 (99%)	177 (86%)	30 (14%)	0	100	100
29	d	199/201 (99%)	182 (92%)	17 (8%)	0	100	100
30	e	175/179 (98%)	165 (94%)	10 (6%)	0	100	100
31	f	174/177 (98%)	157 (90%)	17 (10%)	0	100	100
32	g	147/149 (99%)	124 (84%)	23 (16%)	0	100	100
33	i	139/142 (98%)	124 (89%)	15 (11%)	0	100	100
34	j	140/142 (99%)	120 (86%)	20 (14%)	0	100	100
35	k	120/123 (98%)	98 (82%)	22 (18%)	0	100	100
36	l	141/144 (98%)	117 (83%)	24 (17%)	0	100	100
37	m	134/136 (98%)	116 (87%)	18 (13%)	0	100	100
38	n	118/127 (93%)	104 (88%)	14 (12%)	0	100	100
39	o	114/117 (97%)	103 (90%)	11 (10%)	0	100	100
40	p	112/115 (97%)	105 (94%)	7 (6%)	0	100	100
41	q	115/118 (98%)	108 (94%)	7 (6%)	0	100	100
42	r	101/103 (98%)	88 (87%)	13 (13%)	0	100	100
43	s	108/110 (98%)	92 (85%)	16 (15%)	0	100	100
44	t	91/100 (91%)	77 (85%)	14 (15%)	0	100	100
45	u	100/104 (96%)	83 (83%)	17 (17%)	0	100	100
46	v	92/94 (98%)	79 (86%)	13 (14%)	0	100	100
47	w	73/85 (86%)	63 (86%)	10 (14%)	0	100	100
48	x	75/78 (96%)	66 (88%)	9 (12%)	0	100	100
49	y	61/63 (97%)	61 (100%)	0	0	100	100
50	z	56/59 (95%)	50 (89%)	6 (11%)	0	100	100
57	A1	214/329 (65%)	195 (91%)	19 (9%)	0	100	100
57	A2	217/329 (66%)	207 (95%)	10 (5%)	0	100	100
58	B1	1329/1407 (94%)	1205 (91%)	120 (9%)	4 (0%)	36	71
59	B2	1338/1342 (100%)	1206 (90%)	126 (9%)	6 (0%)	30	67
60	W0	80/91 (88%)	77 (96%)	3 (4%)	0	100	100
61	NG	84/181 (46%)	77 (92%)	6 (7%)	1 (1%)	10	43

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
64	a	128/234 (55%)	105 (82%)	23 (18%)	0	100 100
65	0	695/716 (97%)	618 (89%)	72 (10%)	5 (1%)	18 55
66	h	2/6 (33%)	1 (50%)	1 (50%)	0	100 100
All	All	9784/10690 (92%)	8648 (88%)	1117 (11%)	19 (0%)	44 77

5 of 19 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
58	B1	121	PRO
59	B2	897	PRO
59	B2	43	PRO
59	B2	918	LEU
61	NG	102	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	A	42/62 (68%)	42 (100%)	0	100 100
2	B	47/48 (98%)	47 (100%)	0	100 100
3	C	45/49 (92%)	44 (98%)	1 (2%)	45 64
4	D	38/38 (100%)	35 (92%)	3 (8%)	11 32
5	E	51/52 (98%)	46 (90%)	5 (10%)	7 24
6	F	34/34 (100%)	33 (97%)	1 (3%)	37 58
7	G	180/199 (90%)	172 (96%)	8 (4%)	25 47
8	H	170/190 (90%)	158 (93%)	12 (7%)	13 35
9	I	171/173 (99%)	166 (97%)	5 (3%)	37 58
10	J	119/126 (94%)	113 (95%)	6 (5%)	22 43
11	K	87/116 (75%)	82 (94%)	5 (6%)	18 41
12	L	124/147 (84%)	121 (98%)	3 (2%)	43 63
13	M	104/105 (99%)	102 (98%)	2 (2%)	50 66

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
14	N	105/107 (98%)	105 (100%)	0	100 100
15	O	86/90 (96%)	77 (90%)	9 (10%)	6 22
16	P	89/99 (90%)	88 (99%)	1 (1%)	65 74
17	Q	103/104 (99%)	101 (98%)	2 (2%)	50 66
18	R	92/96 (96%)	91 (99%)	1 (1%)	65 74
19	S	83/84 (99%)	82 (99%)	1 (1%)	63 73
20	T	76/77 (99%)	76 (100%)	0	100 100
21	U	65/65 (100%)	65 (100%)	0	100 100
22	V	74/78 (95%)	74 (100%)	0	100 100
23	W	56/65 (86%)	56 (100%)	0	100 100
24	X	70/79 (89%)	70 (100%)	0	100 100
25	Y	65/66 (98%)	65 (100%)	0	100 100
26	Z	55/61 (90%)	46 (84%)	9 (16%)	2 12
27	b	216/218 (99%)	212 (98%)	4 (2%)	50 66
28	c	164/164 (100%)	163 (99%)	1 (1%)	78 80
29	d	165/165 (100%)	160 (97%)	5 (3%)	36 57
30	e	148/150 (99%)	146 (99%)	2 (1%)	59 71
31	f	137/138 (99%)	136 (99%)	1 (1%)	76 79
32	g	114/114 (100%)	111 (97%)	3 (3%)	40 60
33	i	109/110 (99%)	109 (100%)	0	100 100
34	j	116/116 (100%)	113 (97%)	3 (3%)	40 60
35	k	103/104 (99%)	100 (97%)	3 (3%)	37 58
36	l	102/103 (99%)	100 (98%)	2 (2%)	48 65
37	m	109/109 (100%)	108 (99%)	1 (1%)	70 76
38	n	100/103 (97%)	98 (98%)	2 (2%)	48 65
39	o	86/87 (99%)	86 (100%)	0	100 100
40	p	99/100 (99%)	99 (100%)	0	100 100
41	q	89/90 (99%)	89 (100%)	0	100 100
42	r	84/84 (100%)	84 (100%)	0	100 100
43	s	93/93 (100%)	87 (94%)	6 (6%)	15 37
44	t	80/84 (95%)	77 (96%)	3 (4%)	29 51

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
45	u	83/85 (98%)	82 (99%)	1 (1%)	63 73
46	v	78/78 (100%)	77 (99%)	1 (1%)	61 72
47	w	57/63 (90%)	57 (100%)	0	100 100
48	x	67/68 (98%)	65 (97%)	2 (3%)	36 57
49	y	55/55 (100%)	55 (100%)	0	100 100
50	z	48/49 (98%)	47 (98%)	1 (2%)	47 65
57	A1	185/286 (65%)	174 (94%)	11 (6%)	18 40
57	A2	186/286 (65%)	182 (98%)	4 (2%)	45 64
58	B1	1110/1168 (95%)	1020 (92%)	90 (8%)	11 31
59	B2	1150/1157 (99%)	1115 (97%)	35 (3%)	36 57
60	W0	70/75 (93%)	68 (97%)	2 (3%)	37 58
64	a	109/181 (60%)	98 (90%)	11 (10%)	7 23
65	0	574/588 (98%)	554 (96%)	20 (4%)	32 53
66	h	2/2 (100%)	2 (100%)	0	100 100
All	All	8119/8683 (94%)	7831 (96%)	288 (4%)	32 53

5 of 288 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
59	B2	615	VAL
65	0	662	GLU
59	B2	895	LEU
64	a	165	ASN
36	l	85	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 157 such sidechains are listed below:

Mol	Chain	Res	Type
58	B1	196	GLN
64	a	172	HIS
58	B1	469	HIS
59	B2	554	HIS
65	0	276	GLN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
51	1	2902/2904 (99%)	439 (15%)	6 (0%)
52	2	119/120 (99%)	18 (15%)	0
53	3	1538/1542 (99%)	193 (12%)	1 (0%)
54	4	20/38 (52%)	9 (45%)	1 (5%)
62	5	75/76 (98%)	45 (60%)	10 (13%)
63	6	76/77 (98%)	14 (18%)	0
All	All	4730/4757 (99%)	718 (15%)	18 (0%)

5 of 718 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
51	1	10	A
51	1	12	U
51	1	23	G
51	1	34	U
51	1	35	G

5 of 18 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
62	5	57	G
62	5	75	C
62	5	73	A
62	5	7	A
62	5	48	C

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

4 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	$\#\|Z\| > 2$
66	KBE	h	1	66	8,8,9	0.59	0	6,8,10	1.19	0
66	UAL	h	5	66	6,8,9	2.35	2 (33%)	4,9,11	1.87	1 (25%)
66	5OH	h	6	66	7,12,13	0.74	0	4,16,18	1.35	1 (25%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
66	DPP	h	2	66	4,5,6	0.51	0	1,5,7	0.06	0

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
66	KBE	h	1	66	-	0/7/7/8	-
66	UAL	h	5	66	-	0/3/7/9	-
66	5OH	h	6	66	-	0/2/18/20	0/1/1/1
66	DPP	h	2	66	-	0/2/4/6	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
66	h	5	UAL	C1-N1	-4.91	1.32	1.40
66	h	5	UAL	C-CA	-2.80	1.40	1.45

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
66	h	5	UAL	O-C-CA	-3.28	121.27	125.39
66	h	6	5OH	CR-CB-CA	-2.43	110.03	112.61

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

3 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
66	h	5	UAL	2	0
66	h	6	5OH	5	0
66	h	2	DPP	2	0

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

2 ligands 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	$\#\|Z\| > 2$
67	GDP	0	801	-	29,30,30	1.17	3 (10%)	45,47,47	1.88	8 (17%)
68	PO4	0	802	-	4,4,4	1.01	0	6,6,6	0.50	0

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
67	GDP	0	801	-	-	2/16/32/32	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
67	0	801	GDP	C5-C4	2.77	1.46	1.38
67	0	801	GDP	C6-N1	-2.63	1.33	1.38
67	0	801	GDP	C4-N9	-2.01	1.33	1.38

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
67	0	801	GDP	C5-C4-N3	-5.99	118.85	128.39
67	0	801	GDP	C2-N3-C4	5.06	121.02	112.30
67	0	801	GDP	N9-C4-N3	4.47	134.90	125.95
67	0	801	GDP	C6-C5-N7	3.60	136.85	130.29
67	0	801	GDP	C4-C5-N7	-2.75	106.31	110.67

There are no chirality outliers.

All (2) torsion outliers are listed below:

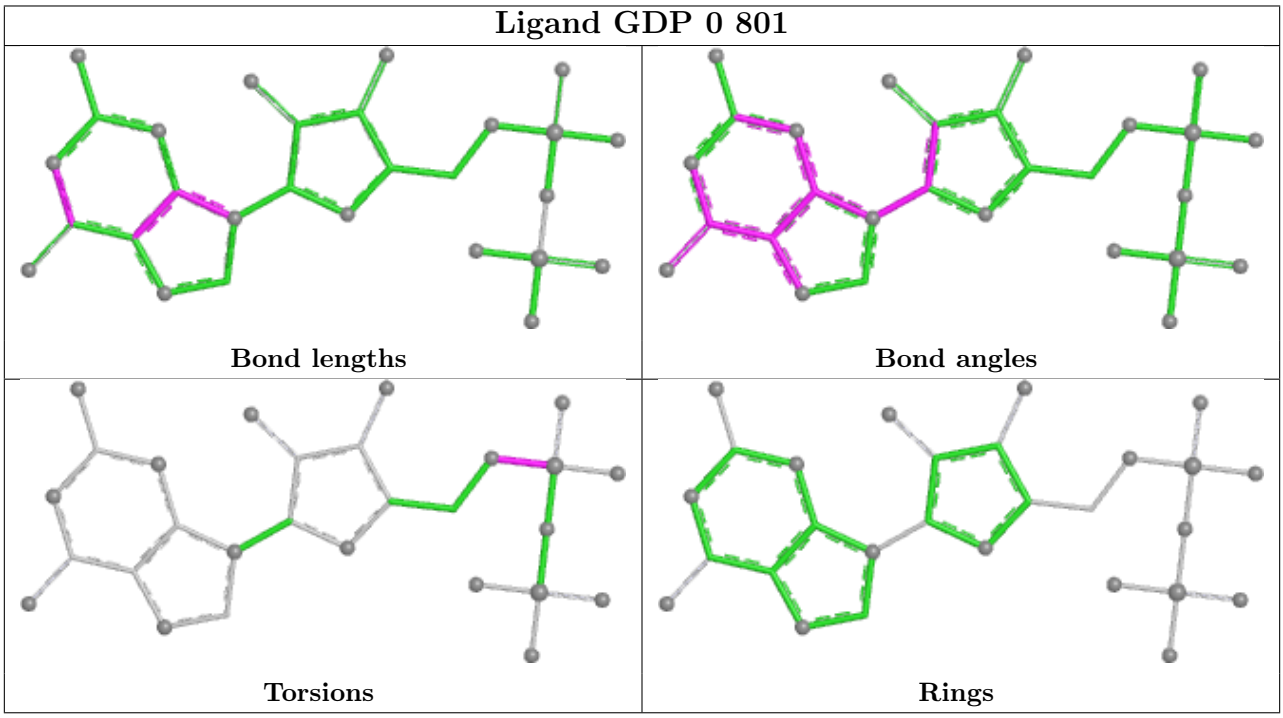
Mol	Chain	Res	Type	Atoms
67	0	801	GDP	C5'-O5'-PA-O3A
67	0	801	GDP	C5'-O5'-PA-O1A

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
67	0	801	GDP	1	0

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 then 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.

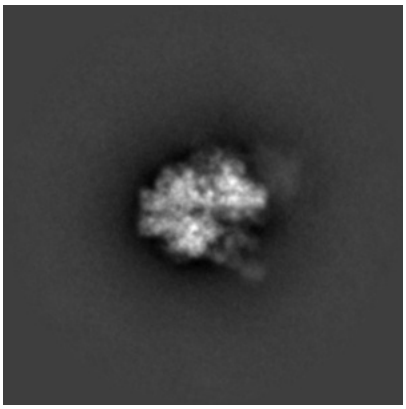
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-38943. These allow visual inspection of the internal detail of the map and identification of artifacts.

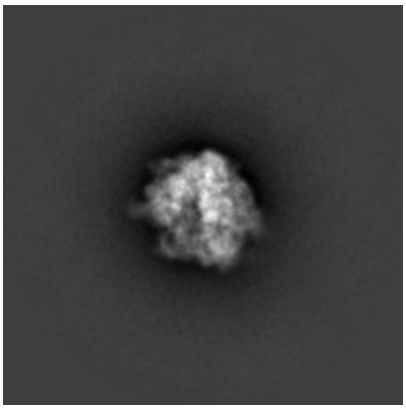
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

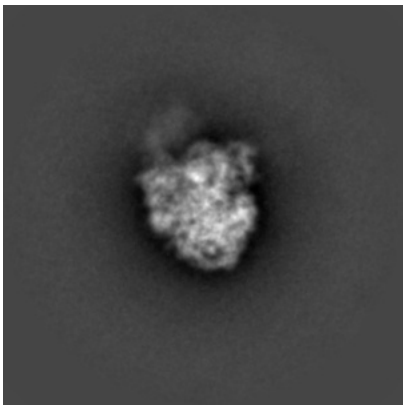
6.1.1 Primary map



X

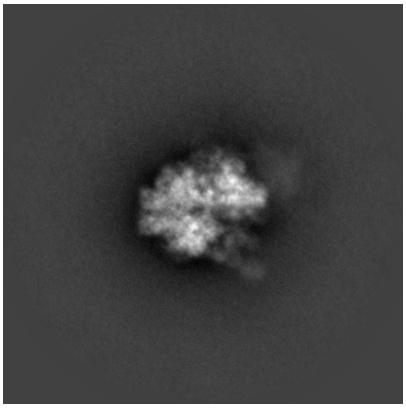


Y

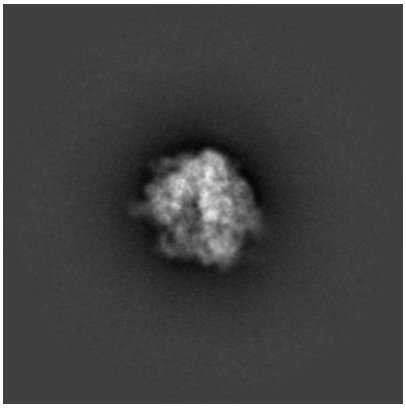


Z

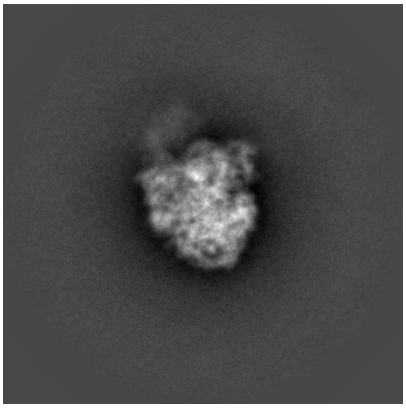
6.1.2 Raw map



X



Y

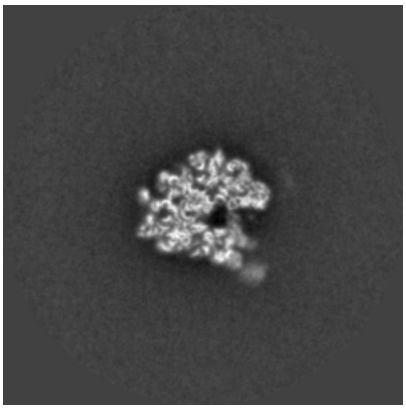


Z

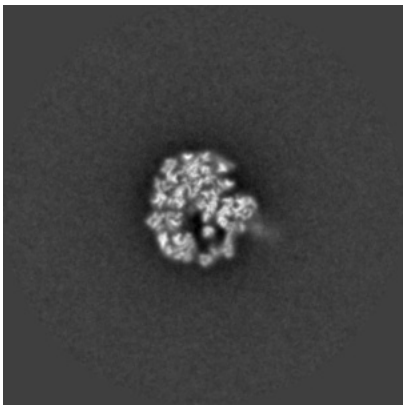
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

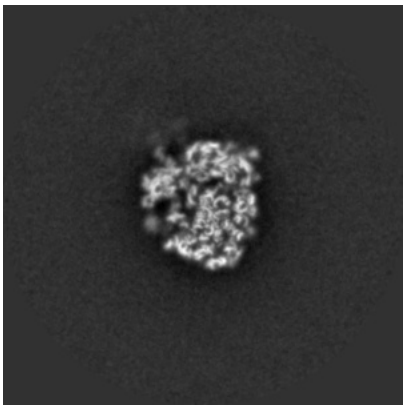
6.2.1 Primary map



X Index: 240

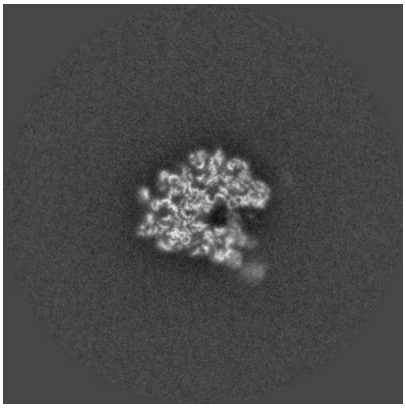


Y Index: 240

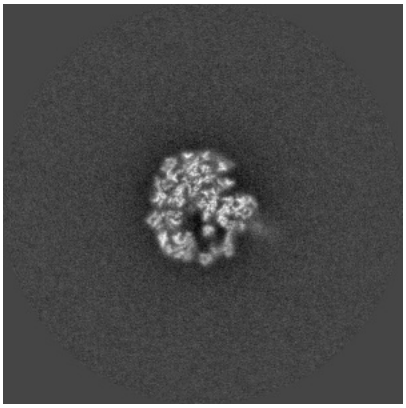


Z Index: 240

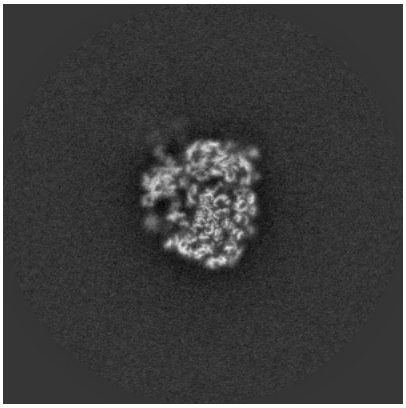
6.2.2 Raw map



X Index: 240



Y Index: 240

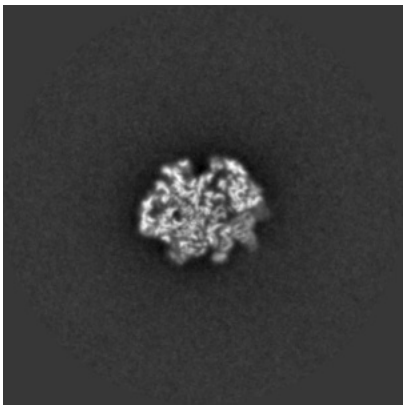


Z Index: 240

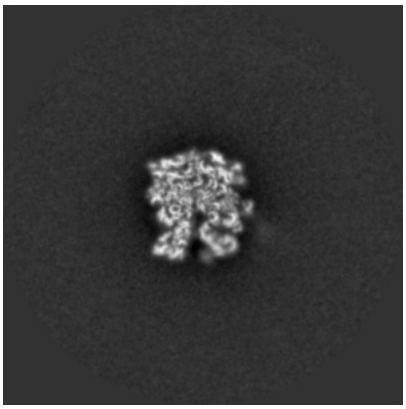
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

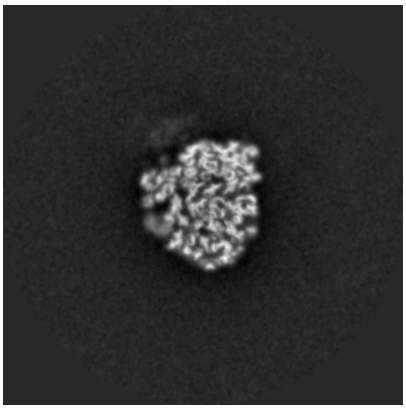
6.3.1 Primary map



X Index: 263

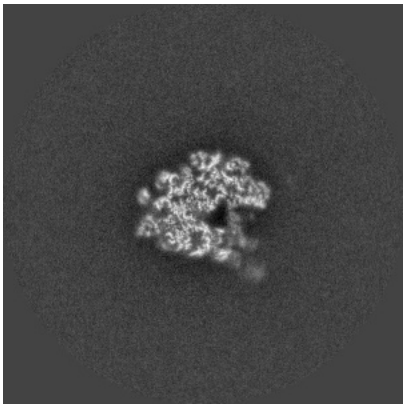


Y Index: 225

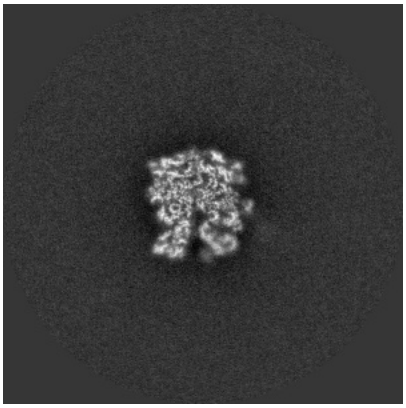


Z Index: 245

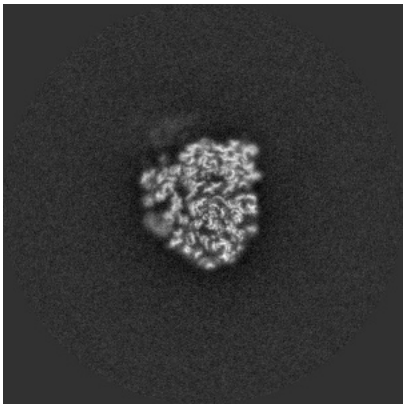
6.3.2 Raw map



X Index: 243



Y Index: 225

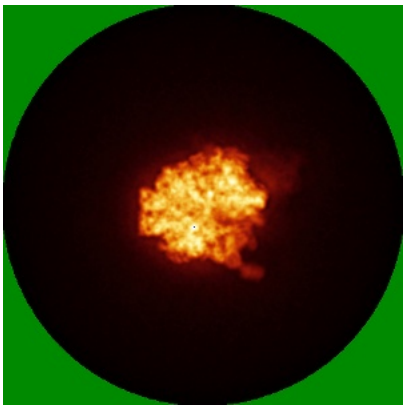


Z Index: 246

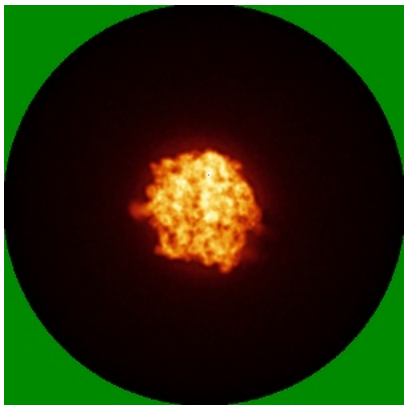
The images above show the largest variance slices of the map in three orthogonal directions.

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

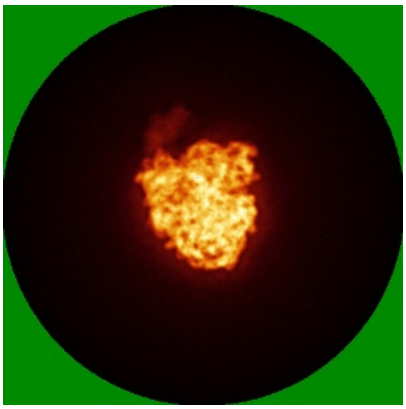
6.4.1 Primary map



X

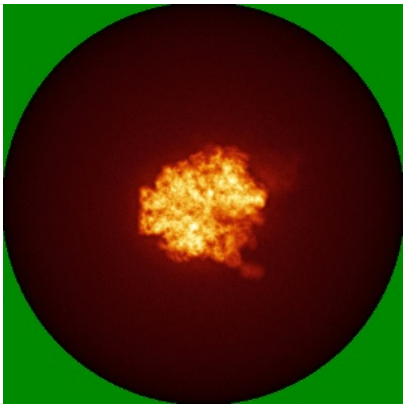


Y

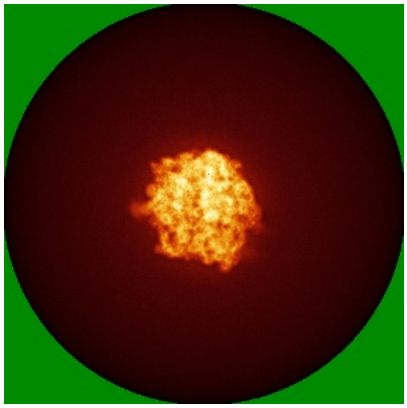


Z

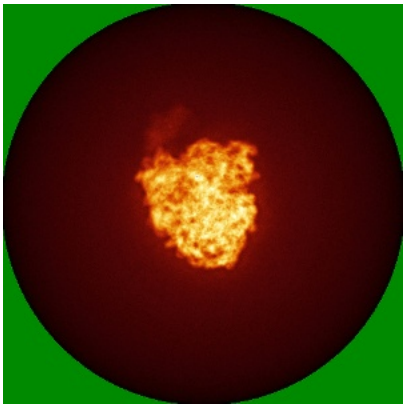
6.4.2 Raw map



X



Y



Z

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

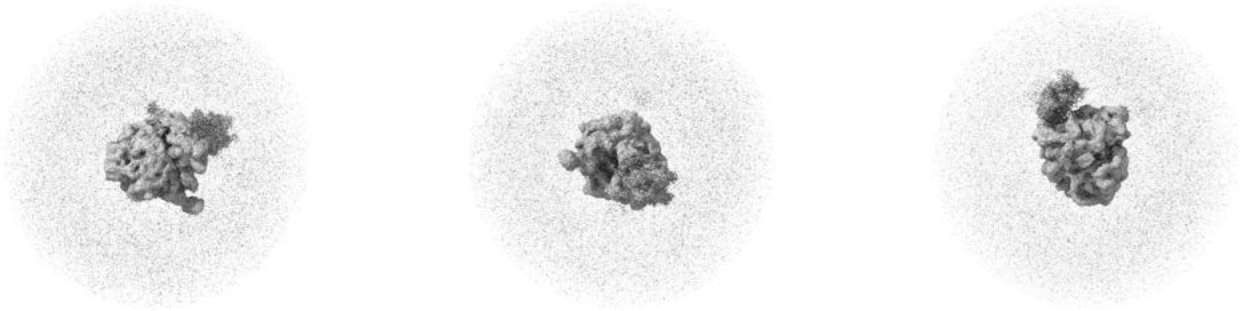
6.5 Orthogonal surface views (i)

6.5.1 Primary map

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.006. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 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.

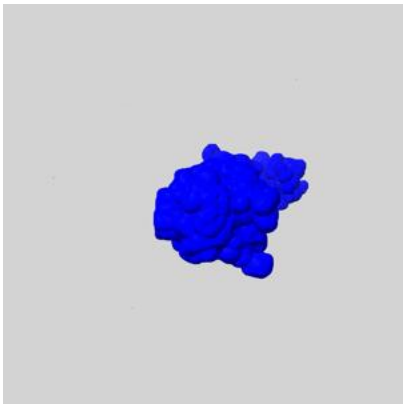
6.6 Mask visualisation

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

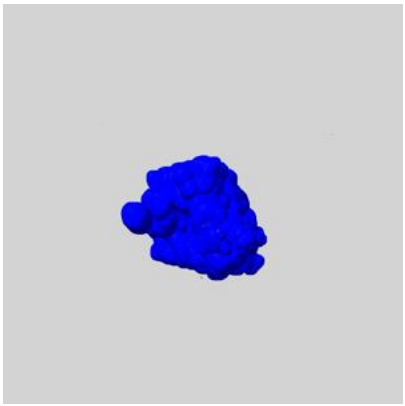
A mask typically either:

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

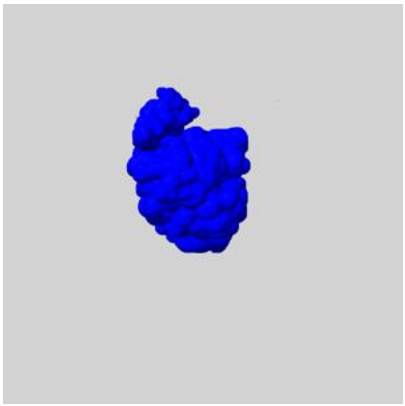
6.6.1 emd_38943_msk_1.map



X



Y

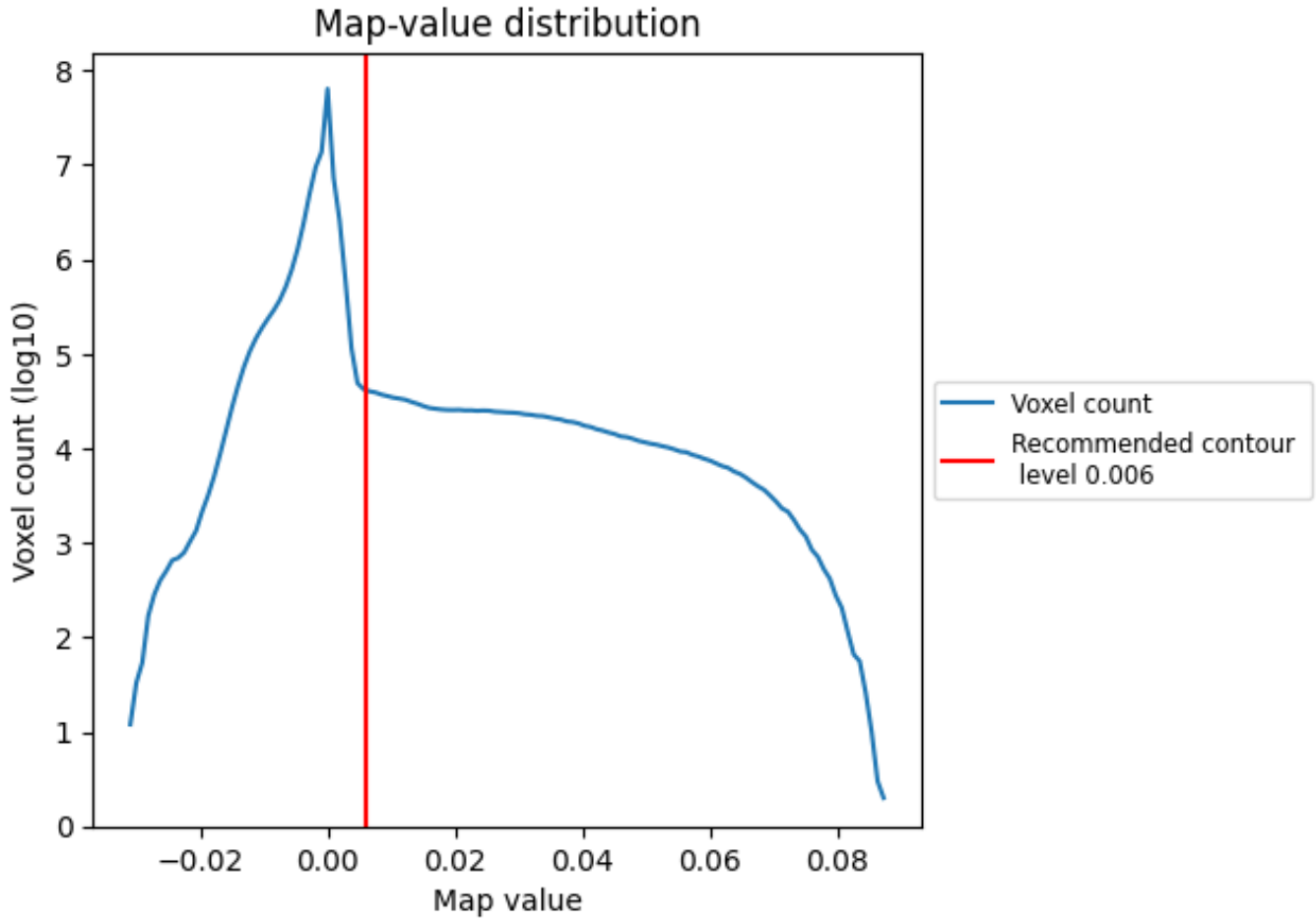


Z

7 Map analysis

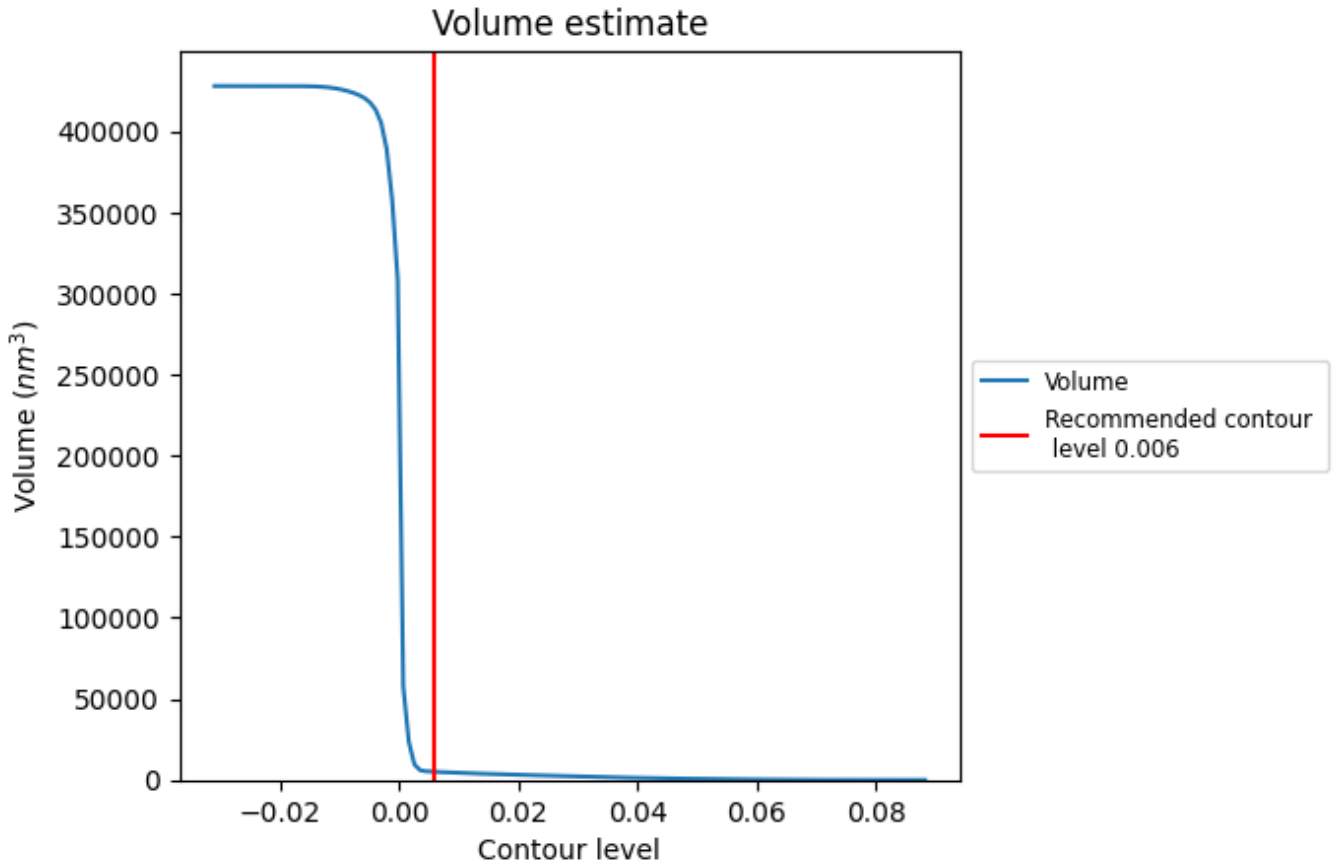
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



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

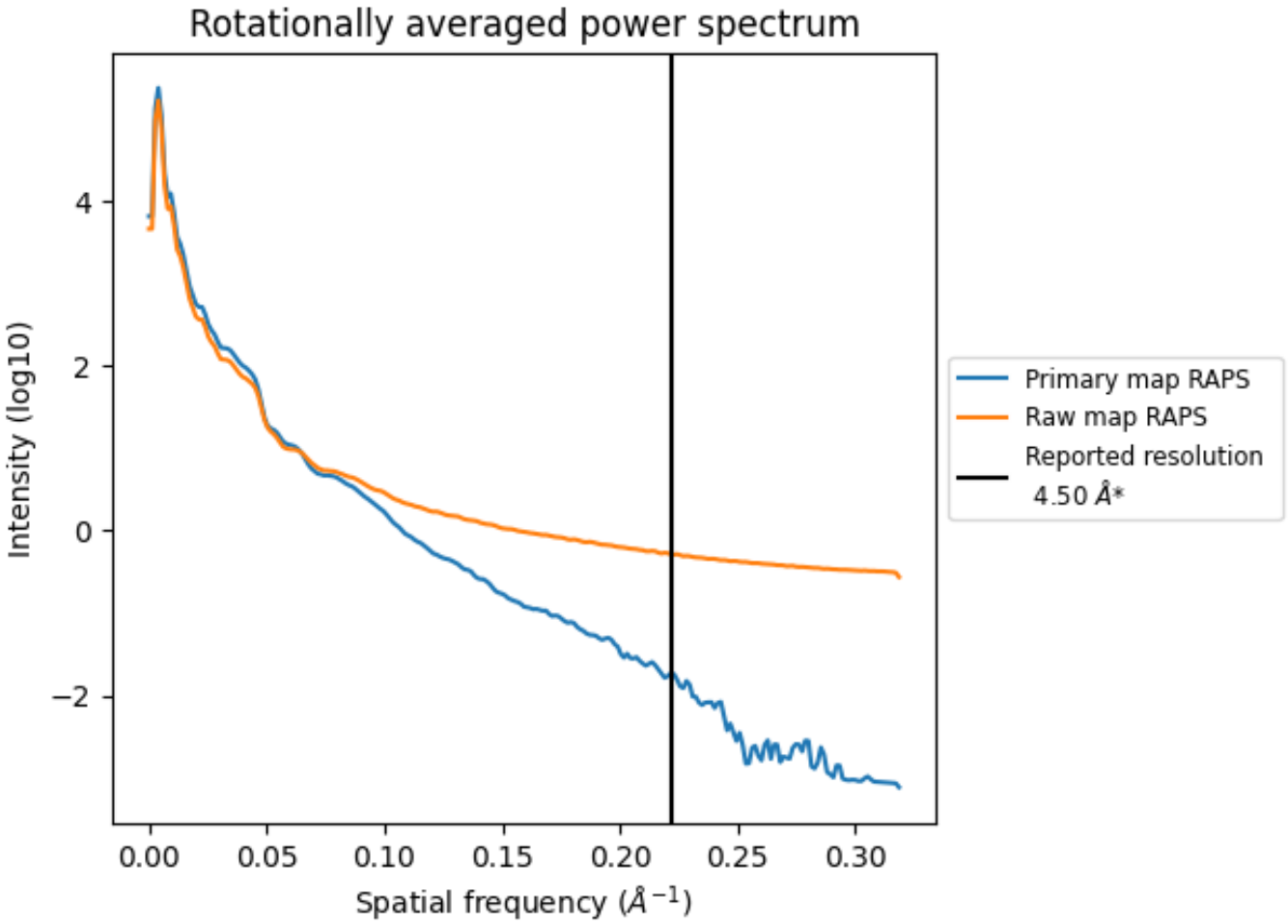
7.2 Volume estimate (i)



The volume at the recommended contour level is 5051 nm^3; this corresponds to an approximate mass of 4562 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)

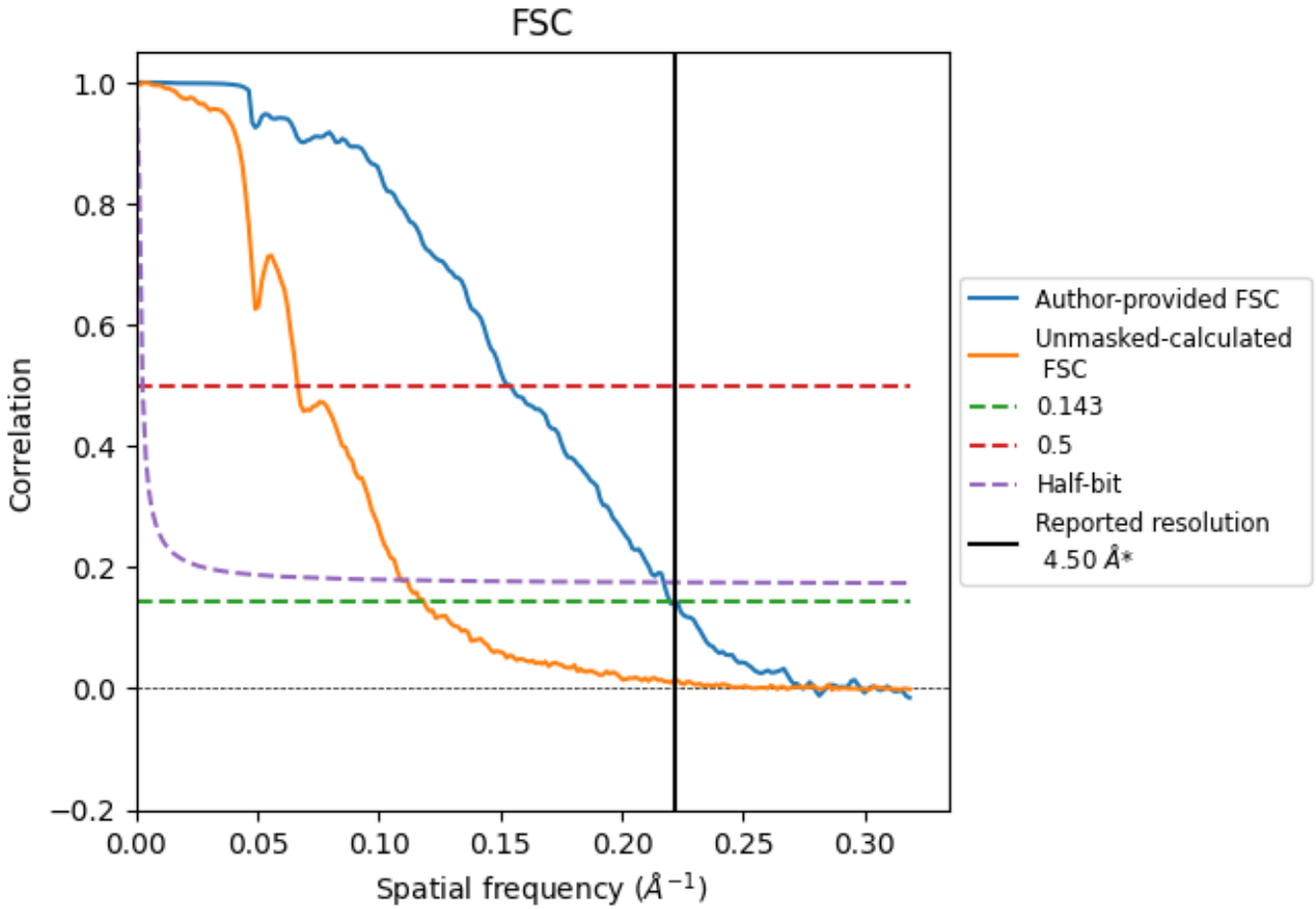


*Reported resolution corresponds to spatial frequency of 0.222 Å^{-1}

8 Fourier-Shell correlation

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



*Reported resolution corresponds to spatial frequency of 0.222 Å^{-1}

8.2 Resolution estimates (i)

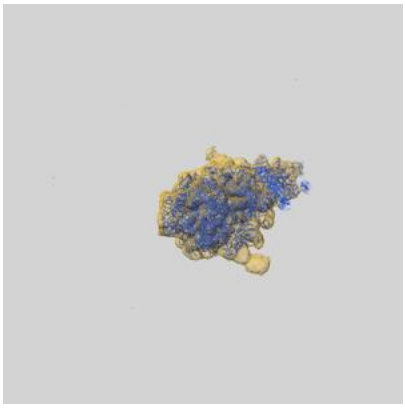
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.50	-	-
Author-provided FSC curve	4.55	6.49	4.60
Unmasked-calculated*	8.44	15.02	9.13

*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 8.44 differs from the reported value 4.5 by more than 10 %

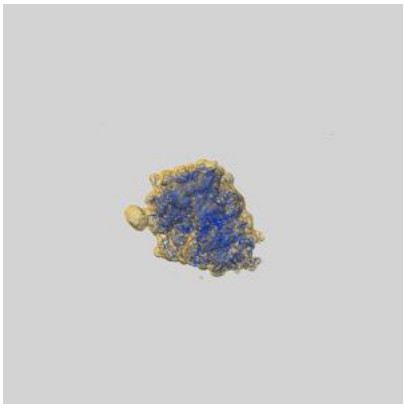
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-38943 and PDB model 8Y5N. Per-residue inclusion information can be found in section 3 on page 18.

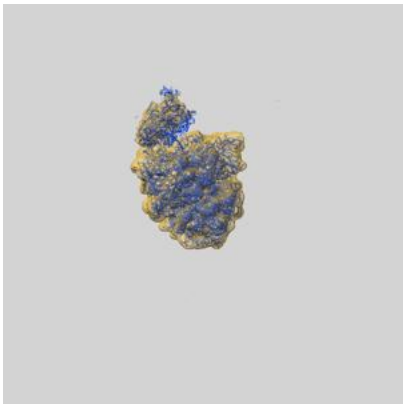
9.1 Map-model overlay



X



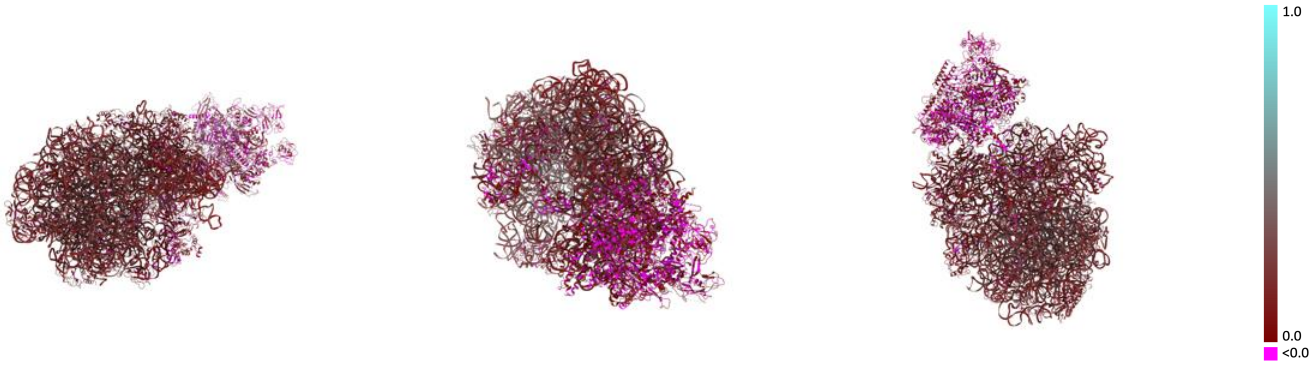
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.006 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.

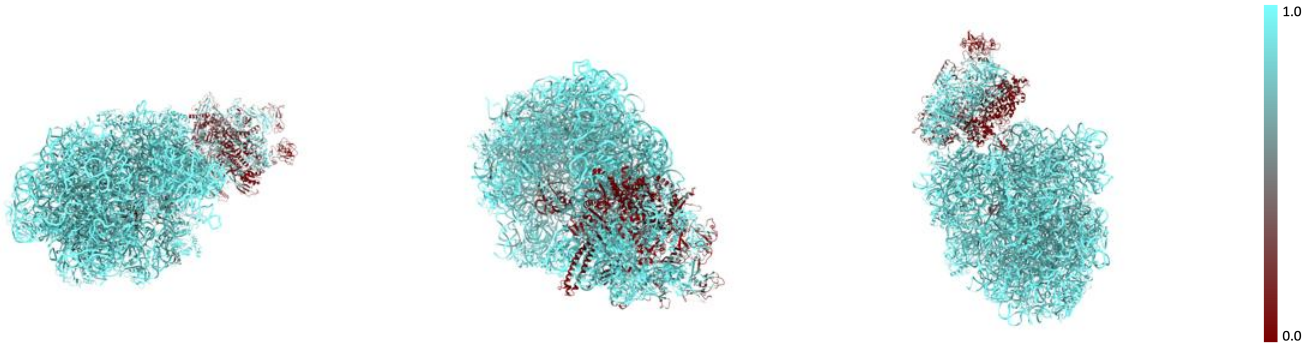
9.2 Q-score mapped to coordinate model



X Y Z

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

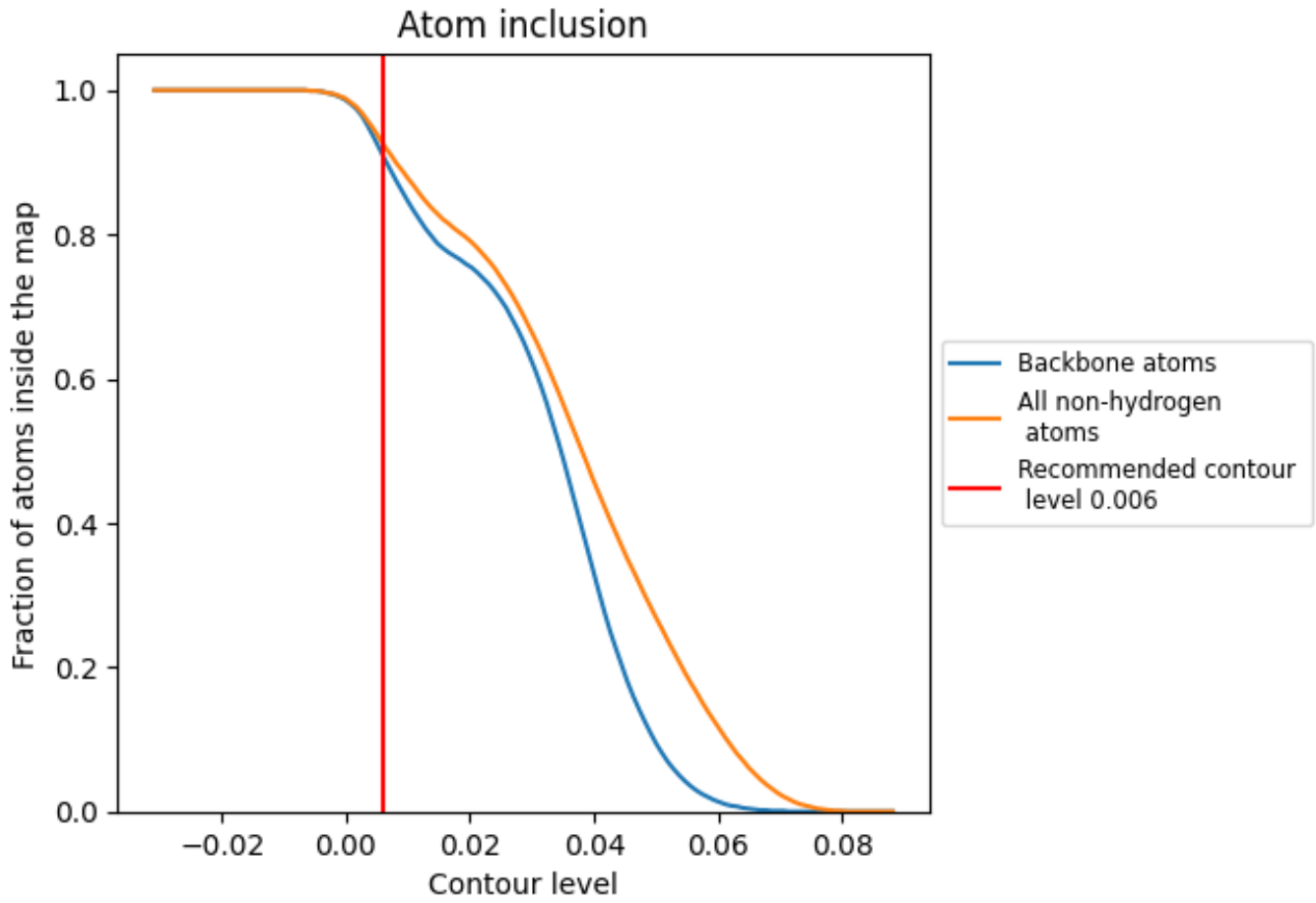
9.3 Atom inclusion mapped to coordinate model



X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.006).

9.4 Atom inclusion (i)



At the recommended contour level, 91% of all backbone atoms, 92% 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 (0.006) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.9250	0.1580
0	0.8730	0.0920
1	1.0000	0.2110
2	1.0000	0.1580
3	1.0000	0.1800
4	0.9380	0.1350
5	0.5650	0.0810
6	0.9960	0.1750
8	0.8160	0.0890
9	0.7410	0.0960
A	0.9970	0.1060
A1	0.5740	0.0740
A2	0.6060	0.0320
B	0.9950	0.1630
B1	0.4920	0.0580
B2	0.6440	0.0520
C	0.9750	0.1480
D	0.9920	0.1470
E	1.0000	0.1420
F	1.0000	0.1290
G	0.9950	0.1450
H	0.9980	0.1450
I	0.9970	0.1280
J	1.0000	0.1360
K	0.9950	0.1540
L	0.9900	0.1350
M	0.9880	0.1100
N	0.9880	0.1030
NG	0.0230	0.1060
O	0.9990	0.1210
P	0.9950	0.1590
Q	0.9700	0.1500
R	0.9910	0.1360
S	1.0000	0.1200
T	0.9990	0.1430

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Chain	Atom inclusion	Q-score
U	1.0000	0.1030
V	0.9970	0.1060
W	1.0000	0.1440
W0	0.0680	0.0080
X	1.0000	0.1200
Y	0.9830	0.1080
Z	0.9540	0.1430
a	0.9890	0.1000
b	0.9930	0.1830
c	0.9970	0.1710
d	0.9970	0.1500
e	0.9700	0.1160
f	0.9950	0.1360
g	0.9380	0.1300
h	1.0000	0.1970
i	0.9090	0.0490
j	1.0000	0.1690
k	0.9810	0.1920
l	0.9990	0.1440
m	0.9800	0.1540
n	1.0000	0.1640
o	1.0000	0.1020
p	0.9940	0.1790
q	0.9990	0.1360
r	0.9990	0.1520
s	0.9950	0.1750
t	0.9990	0.1480
u	0.9920	0.1380
v	0.9970	0.1450
w	0.9960	0.1140
x	1.0000	0.1720
y	0.9980	0.1500
z	0.9930	0.1490