wwPDB EM Validation Summary Report

Mar 23, 2026 – 07:33 pm GMT

PDB ID	:	28LU / pdb_000028lu
EMDB ID	:	EMD-56602
Title	:	Structure of the Chlamydomonas reinhardtii chlororibosome with factor pY
Authors	:	Waltz, F.; Kater, L.; Engel, B.D.
Deposited on	:	2026-02-05
Resolution	:	2.60 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 ⓘ 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:

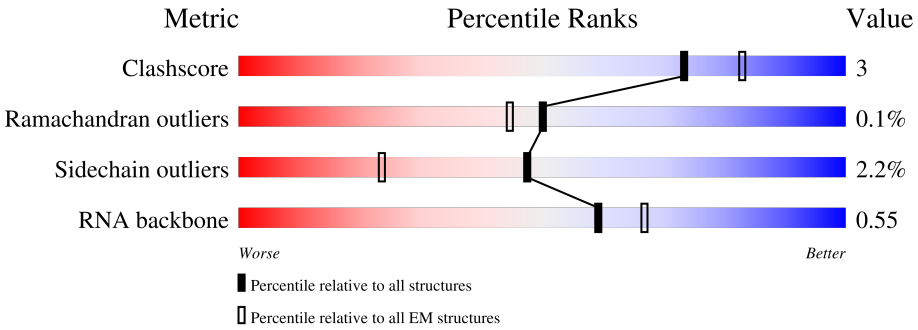
EMDB validation analysis	:	0.0.1.dev132
Mogul	:	1.8.4, CSD as541be (2020)
MolProbity	:	4-5-2 with Phenix2.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics	:	202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.48.1

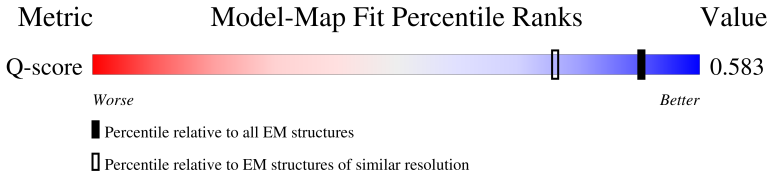
1 Overall quality at a glance

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)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	210492	15764	-
Ramachandran outliers	207382	16835	-
Sidechain outliers	206894	16415	-
RNA backbone	6643	2191	-
Q-score	-	25397	8728 (2.10 - 3.10)

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	436	30% 48% 6% 46%
2	d	257	28% 88% 12%
3	f	171	53% 7% 40%

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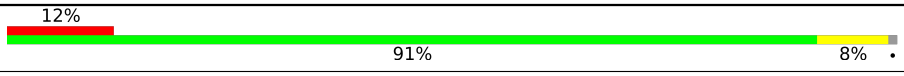
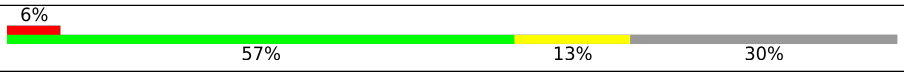
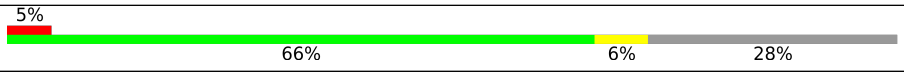
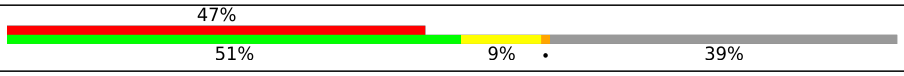
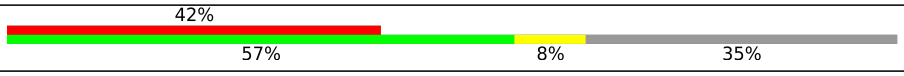
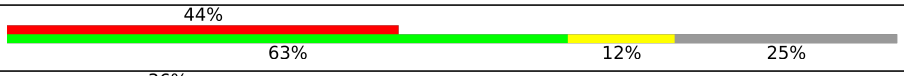
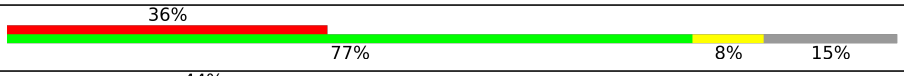
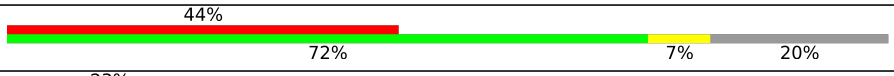
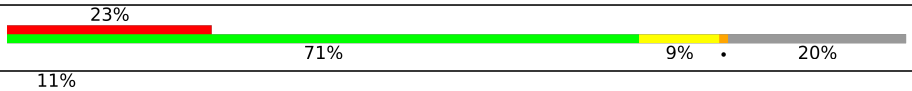
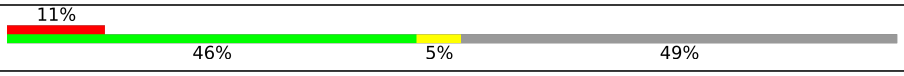
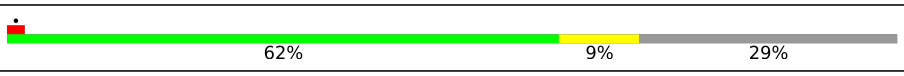
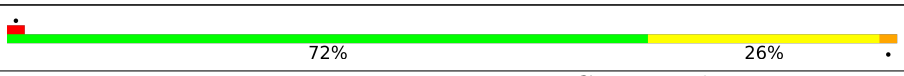
Mol	Chain	Length	Quality of chain
4	g	168	
5	h	141	
6	j	169	
7	k	130	
8	l	133	
9	m	164	
10	n	100	
11	o	141	
12	p	128	
13	q	105	
14	r	137	
15	s	92	
16	t	166	
17	u	184	
18	v	298	
19	x	120	
20	w	560	
21	2	1470	
22	b	910	
23	c	712	
24	e	673	
25	i	191	
26	y	286	
27	0	66	
28	3	121	

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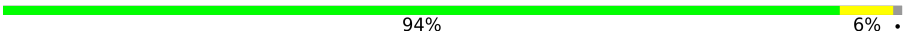
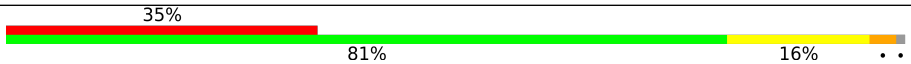
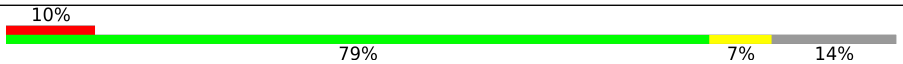
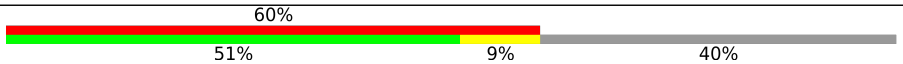
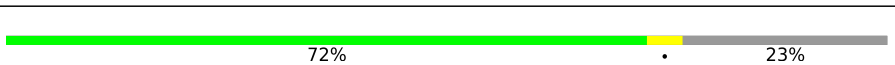
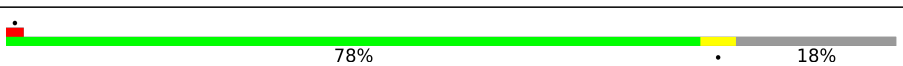
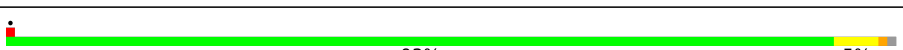
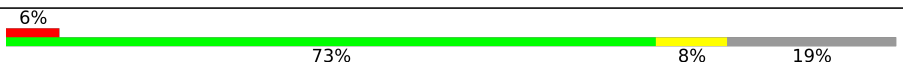
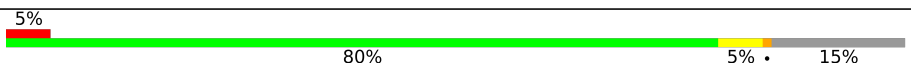
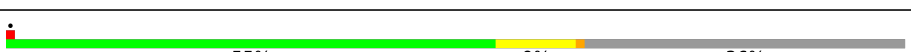
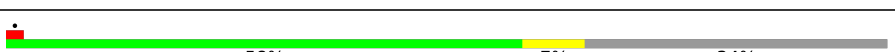
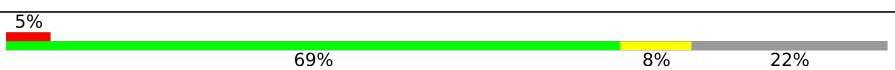
Mol	Chain	Length	Quality of chain
29	5	47	
30	6	101	
31	7	124	
32	8	114	
33	9	37	
34	B	278	
35	C	259	
36	D	243	
37	E	179	
38	F	207	
39	G	200	
40	H	235	
41	I	176	
42	J	225	
43	K	122	
44	L	241	
45	M	136	
46	N	173	
47	O	145	
48	P	153	
49	Q	112	
50	R	179	
51	S	175	
52	T	111	
53	U	170	

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Mol	Chain	Length	Quality of chain
54	V	161	6% 66% 29%
55	W	195	65% 6% 29%
56	X	134	72% 7% 21%
57	Z	98	39% 58%
58	Y	136	32% 32% 15% 52%
59	1	2375	77% 21%
60	4	272	79% 18%

2 Entry composition (i)

There are 62 unique types of molecules in this entry. The entry contains 159560 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 Ribosomal protein S1 homologue.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	a	236	1868	1175	285	395	13	0	0

- Molecule 2 is a protein called Small ribosomal subunit protein uS4c.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	d	256	2107	1356	403	341	7	0	0

- Molecule 3 is a protein called bS6c.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	f	103	850	543	148	156	3	0	0

- Molecule 4 is a protein called Small ribosomal subunit protein uS7c.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	g	167	1334	846	253	229	6	0	0

- Molecule 5 is a protein called Small ribosomal subunit protein uS8c.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	h	141	1113	698	206	203	6	0	0

- Molecule 6 is a protein called Small ribosomal subunit protein uS10 domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	j	122	957	597	173	178	9	0	0

- Molecule 7 is a protein called Small ribosomal subunit protein uS11c.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	k	117	Total	C	N	O	S	0	0
			894	560	179	151	4		

- Molecule 8 is a protein called Small ribosomal subunit protein uS12c.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	l	121	Total	C	N	O	S	0	0
			941	591	190	157	3		

- Molecule 9 is a protein called uS13c.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	m	114	Total	C	N	O	S	0	0
			924	569	181	172	2		

- Molecule 10 is a protein called Small ribosomal subunit protein uS14c.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	n	99	Total	C	N	O	S	0	0
			814	513	163	132	6		

- Molecule 11 is a protein called 30S ribosomal protein S15.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	o	101	Total	C	N	O	S	0	0
			813	502	156	151	4		

- Molecule 12 is a protein called 30S ribosomal protein S16, chloroplastic.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	p	80	Total	C	N	O	S	0	0
			666	433	120	112	1		

- Molecule 13 is a protein called Small ribosomal subunit protein uS17c.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	q	78	Total	C	N	O	S	0	0
			621	386	117	116	2		

- Molecule 14 is a protein called Small ribosomal subunit protein bS18c.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	r	81	Total	C	N	O	S	0	0
			664	434	123	106	1		

- Molecule 15 is a protein called Small ribosomal subunit protein uS19c.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	s	81	Total	C	N	O	S	0	0
			645	414	122	106	3		

- Molecule 16 is a protein called bS20c.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	t	119	Total	C	N	O	S	0	0
			935	592	172	167	4		

- Molecule 17 is a protein called bS21c.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	u	92	Total	C	N	O	S	0	0
			789	494	144	147	4		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
u	652	ARG	ASP	conflict	UNP A8HPN4

- Molecule 18 is a protein called 30S ribosomal protein 3, chloroplastic.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	v	181	Total	C	N	O	S	0	0
			1430	907	245	276	2		

- Molecule 19 is a protein called cS26/PSRP8.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	x	60	Total	C	N	O	S	0	0
			462	299	80	81	2		

- Molecule 20 is a protein called Plastid-specific ribosomal protein-7.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	w	365	Total	C	N	O	S	0	0
			2786	1749	429	598	10		

- Molecule 21 is a RNA chain called 16S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	2	1470	Total	C	N	O	P	0	0
			31537	14077	5779	10211	1470		

There are 11 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
2	?	-	C	deletion	GB 41179002
2	?	-	A	deletion	GB 41179002
2	372	A	-	insertion	GB 41179002
2	373	G	-	insertion	GB 41179002
2	871	G	-	insertion	GB 41179002
2	872	G	-	insertion	GB 41179002
2	912	2MG	A	conflict	GB 41179002
2	982	A	-	insertion	GB 41179002
2	983	C	-	insertion	GB 41179002
2	1200	C	-	insertion	GB 41179002
2	1218	A	C	conflict	GB 41179002

- Molecule 22 is a protein called Small ribosomal subunit protein uS2c.

Mol	Chain	Residues	Atoms					AltConf	Trace
22	b	685	Total	C	N	O	S	0	0
			5545	3581	1010	934	20		

- Molecule 23 is a protein called Small ribosomal subunit protein uS3c.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	c	607	Total	C	N	O	S	0	0
			4939	3179	905	844	11		

- Molecule 24 is a protein called uS5c.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	e	536	Total	C	N	O	S	0	0
			3988	2477	658	838	15		

- Molecule 25 is a protein called Small ribosomal subunit protein uS9c.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	i	153	Total	C	N	O	S	0	0
			1189	750	219	217	3		

- Molecule 26 is a protein called Sigma 54 modulation/S30EA ribosomal protein C-terminal domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	y	146	Total	C	N	O	S	0	0
			1155	725	203	225	2		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
y	236	ALA	-	insertion	UNP A0A2K3DSW0

- Molecule 27 is a protein called cL38/PSRP6.

Mol	Chain	Residues	Atoms				AltConf	Trace
27	0	47	Total	C	N	O	0	0
			369	233	76	60		

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
0	17	SER	THR	conflict	UNP A0A835SZL0
0	37	ARG	ALA	conflict	UNP A0A835SZL0
0	38	ALA	SER	conflict	UNP A0A835SZL0
0	41	ASN	ARG	conflict	UNP A0A835SZL0
0	63	ALA	GLY	conflict	UNP A0A835SZL0

- Molecule 28 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	3	121	Total	C	N	O	P	0	0
			2571	1148	449	853	121		

- Molecule 29 is a RNA chain called 3S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	5	47	Total	C	N	O	P	0	0
			1006	450	185	324	47		

- Molecule 30 is a protein called bL33c.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	6	58	Total	C	N	O	S	0	0
			473	293	91	86	3		

- Molecule 31 is a protein called bL34c.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	7	60	Total	C	N	O	S	0	0
			455	271	104	77	3		

- Molecule 32 is a protein called 50S ribosomal protein L35.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	8	68	Total	C	N	O	S	0	0
			520	322	104	91	3		

- Molecule 33 is a protein called Large ribosomal subunit protein bL36c.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	9	37	Total	C	N	O	S	0	0
			292	177	63	46	6		

- Molecule 34 is a protein called Large ribosomal subunit protein uL2c.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	B	276	Total	C	N	O	S	0	0
			2159	1347	431	377	4		

- Molecule 35 is a protein called Large ribosomal subunit protein uL3c.

Mol	Chain	Residues	Atoms					AltConf	Trace
35	C	223	Total	C	N	O	S	0	0
			1681	1057	310	305	9		

- Molecule 36 is a protein called Large ribosomal subunit protein uL4c.

Mol	Chain	Residues	Atoms					AltConf	Trace
36	D	216	Total	C	N	O	S	0	0
			1599	997	290	306	6		

- Molecule 37 is a protein called Large ribosomal subunit protein uL5c.

Mol	Chain	Residues	Atoms					AltConf	Trace
37	E	178	Total	C	N	O	S	0	0
			1413	900	247	260	6		

- Molecule 38 is a protein called Plastid ribosomal protein L6.

Mol	Chain	Residues	Atoms					AltConf	Trace
38	F	177	Total	C	N	O	S	0	0
			1338	845	245	244	4		

- Molecule 39 is a protein called Large ribosomal subunit protein bL9c.

Mol	Chain	Residues	Atoms					AltConf	Trace
39	G	54	Total	C	N	O	S	0	0
			418	272	72	73	1		

- Molecule 40 is a protein called uL10c.

Mol	Chain	Residues	Atoms					AltConf	Trace
40	H	141	Total	C	N	O	S	0	0
			1114	711	189	209	5		

- Molecule 41 is a protein called Large ribosomal subunit protein uL11c.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	I	132	Total	C	N	O	S	0	0
			980	623	171	181	5		

- Molecule 42 is a protein called uL13c.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	J	173	Total	C	N	O	S	0	0
			1346	857	243	243	3		

- Molecule 43 is a protein called Large ribosomal subunit protein uL14c.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	K	122	Total	C	N	O	S	0	0
			942	588	180	169	5		

- Molecule 44 is a protein called uL15c.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	L	198	Total	C	N	O	S	0	0
			1484	921	282	276	5		

- Molecule 45 is a protein called Large ribosomal subunit protein uL16c.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	M	135	Total	C	N	O	S	0	0
			1080	689	211	173	7		

- Molecule 46 is a protein called Large ribosomal subunit protein bL17c.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	N	117	Total	C	N	O	S	0	0
			937	585	185	162	5		

- Molecule 47 is a protein called Large ribosomal subunit protein uL18c.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	O	118	Total	C	N	O	S	0	0
			902	557	173	168	4		

- Molecule 48 is a protein called bL19c.

Mol	Chain	Residues	Atoms					AltConf	Trace
48	P	130	Total	C	N	O	S	0	0
			995	620	199	174	2		

- Molecule 49 is a protein called Large ribosomal subunit protein bL20c.

Mol	Chain	Residues	Atoms					AltConf	Trace
49	Q	111	Total	C	N	O	S	0	0
			943	592	193	152	6		

- Molecule 50 is a protein called bL21c.

Mol	Chain	Residues	Atoms					AltConf	Trace
50	R	115	Total	C	N	O	S	0	0
			907	585	161	157	4		

- Molecule 51 is a protein called Large ribosomal subunit protein uL22c.

Mol	Chain	Residues	Atoms					AltConf	Trace
51	S	115	Total	C	N	O	S	0	0
			903	564	174	157	8		

- Molecule 52 is a protein called uL23c,Large ribosomal subunit protein uL23c.

Mol	Chain	Residues	Atoms					AltConf	Trace
52	T	107	Total	C	N	O	S	0	0
			837	542	148	146	1		

- Molecule 53 is a protein called KOW domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
53	U	132	Total	C	N	O	S	0	0
			1020	650	189	178	3		

- Molecule 54 is a protein called bL27c.

Mol	Chain	Residues	Atoms					AltConf	Trace
54	V	114	Total	C	N	O	S	0	0
			869	535	172	159	3		

- Molecule 55 is a protein called Large ribosomal subunit protein bL28c.

Mol	Chain	Residues	Atoms					AltConf	Trace
55	W	138	Total	C	N	O	S	0	0
			1104	700	205	193	6		

- Molecule 56 is a protein called uL29c.

Mol	Chain	Residues	Atoms					AltConf	Trace
56	X	106	Total	C	N	O	S	0	0
			843	518	169	153	3		

- Molecule 57 is a protein called bL32c.

Mol	Chain	Residues	Atoms				AltConf	Trace
57	Z	41	Total	C	N	O	0	0
			323	213	57	53		

- Molecule 58 is a protein called 50S ribosomal protein L31.

Mol	Chain	Residues	Atoms					AltConf	Trace
58	Y	65	Total	C	N	O	S	0	0
			521	331	90	98	2		

- Molecule 59 is a RNA chain called 23S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
59	1	2375	Total	C	N	O	P	0	0
			50934	22751	9345	16463	2375		

- Molecule 60 is a RNA chain called 7S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
60	4	272	Total	C	N	O	P	0	0
			5856	2616	1106	1862	272		

- Molecule 61 is POTASSIUM ION (CCD ID: K) (formula: K).

Mol	Chain	Residues	Atoms		AltConf
61	2	47	Total	K	0
			47	47	
61	U	1	Total	K	0
			1	1	
61	1	86	Total	K	0
			86	86	
61	4	4	Total	K	0
			4	4	

- Molecule 62 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
62	2	98	Total	Mg	0
			98	98	
62	3	5	Total	Mg	0
			5	5	
62	5	4	Total	Mg	0
			4	4	
62	D	1	Total	Mg	0
			1	1	
62	L	1	Total	Mg	0
			1	1	
62	N	1	Total	Mg	0
			1	1	

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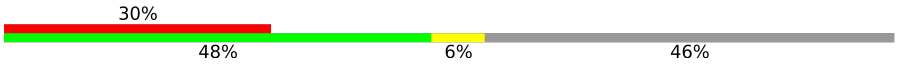
Mol	Chain	Residues	Atoms	AltConf
62	1	205	Total Mg 205 205	0
62	4	7	Total Mg 7 7	0

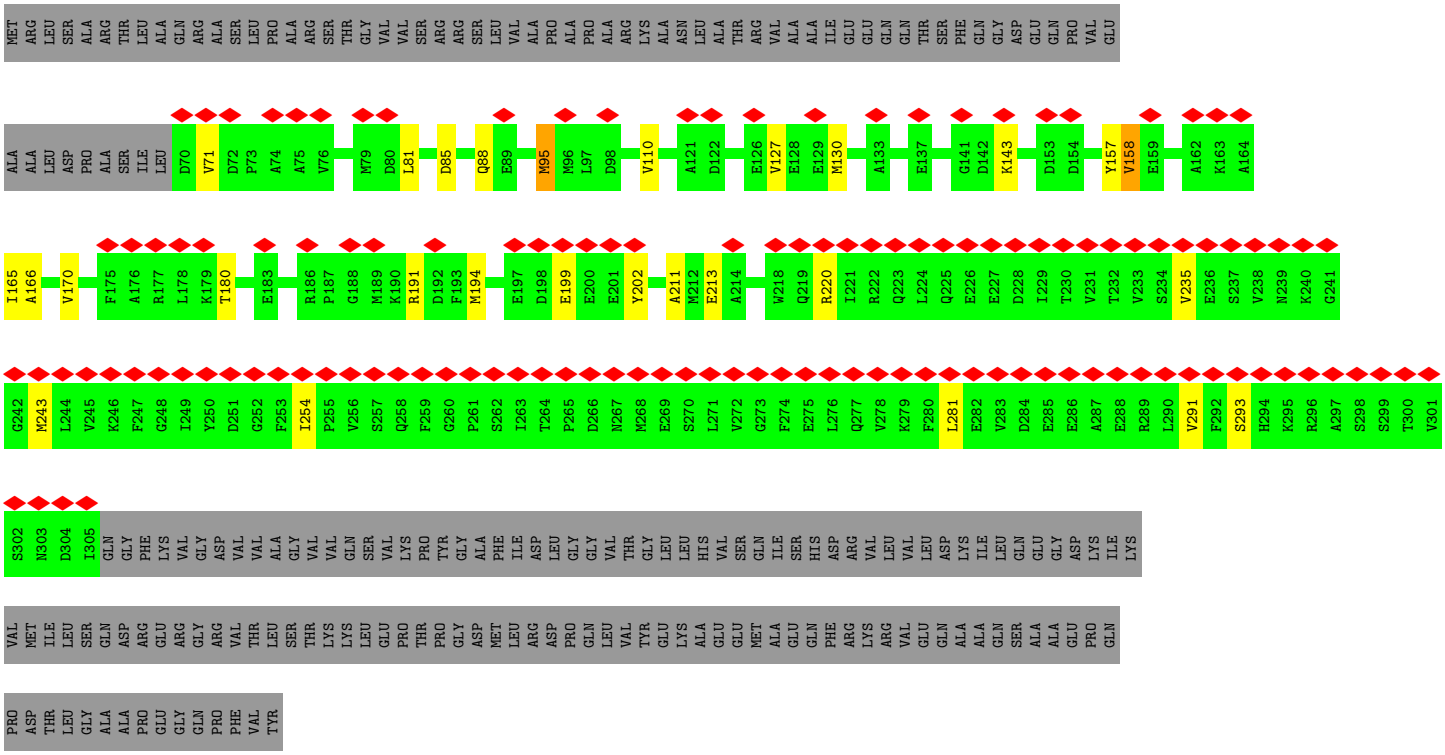
3 Residue-property plots (i)

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: Ribosomal protein S1 homologue

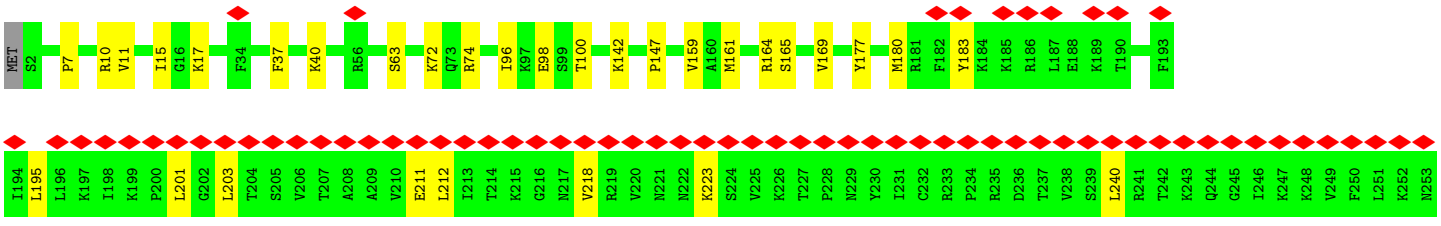
Chain a:

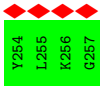




• Molecule 2: Small ribosomal subunit protein uS4c

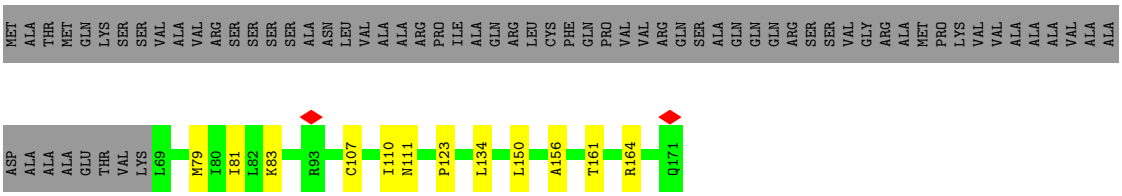
Chain d:





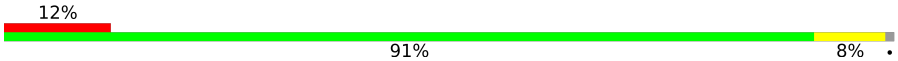
• Molecule 3: bS6c

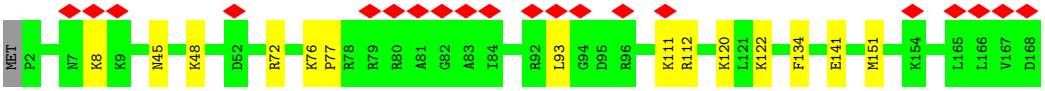
Chain f:



• Molecule 4: Small ribosomal subunit protein uS7c

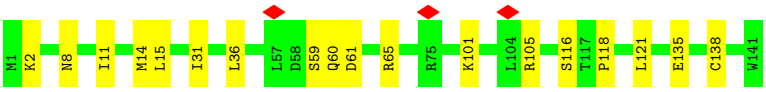
Chain g:





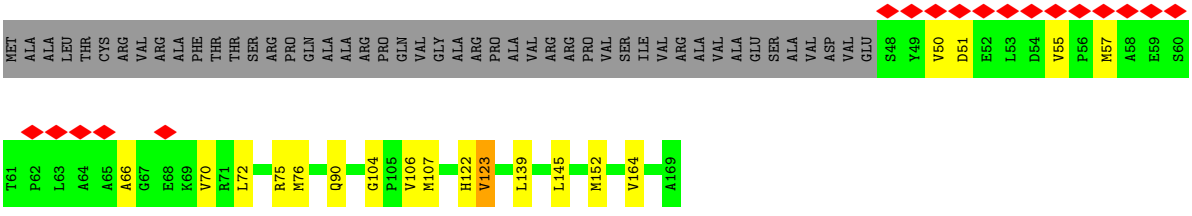
• Molecule 5: Small ribosomal subunit protein uS8c

Chain h:



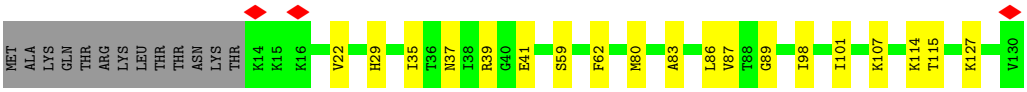
• Molecule 6: Small ribosomal subunit protein uS10 domain-containing protein

Chain j:



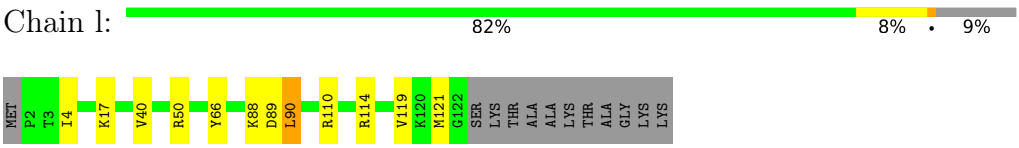
• Molecule 7: Small ribosomal subunit protein uS11c

Chain k:



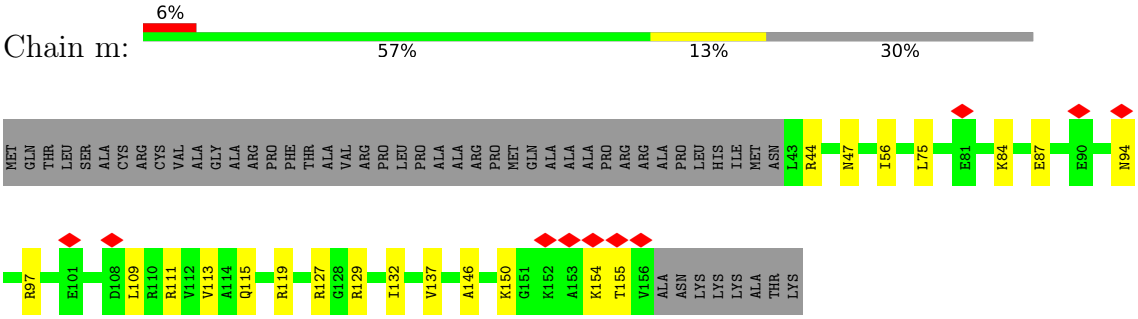
• Molecule 8: Small ribosomal subunit protein uS12c

Chain l:



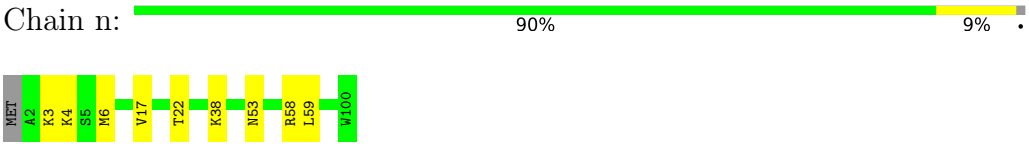
• Molecule 9: uS13c

Chain m:



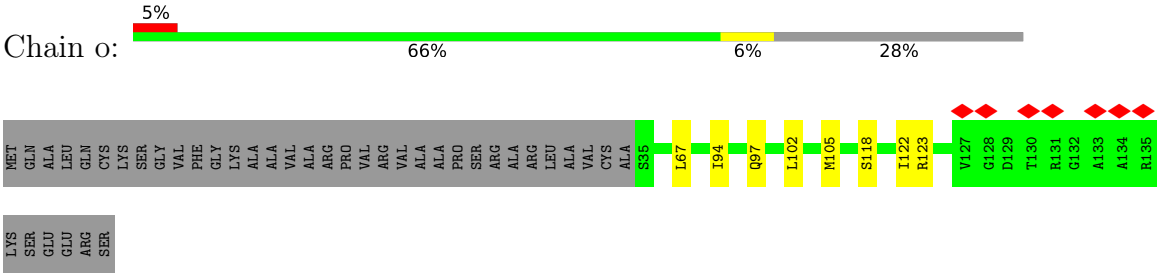
• Molecule 10: Small ribosomal subunit protein uS14c

Chain n:



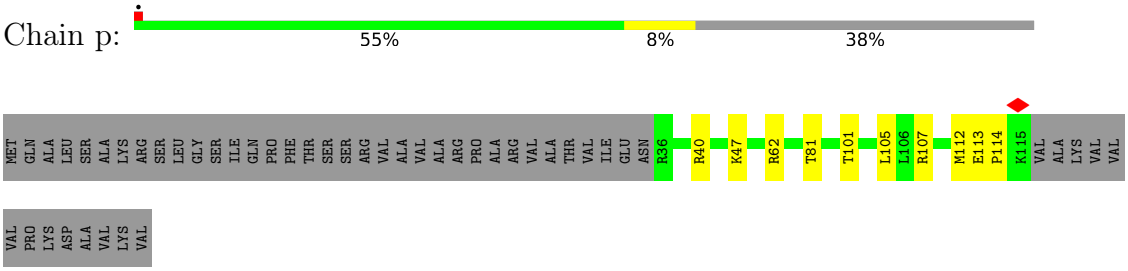
• Molecule 11: 30S ribosomal protein S15

Chain o:



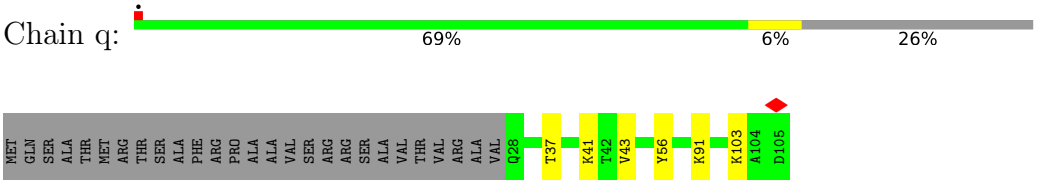
• Molecule 12: 30S ribosomal protein S16, chloroplastic

Chain p:



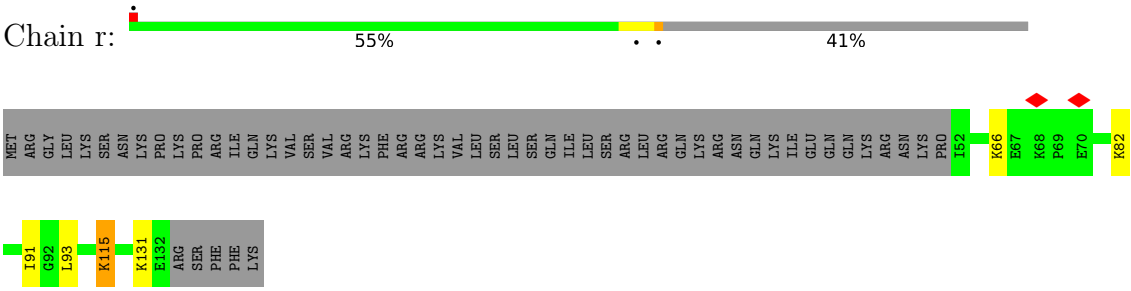
• Molecule 13: Small ribosomal subunit protein uS17c

Chain q:



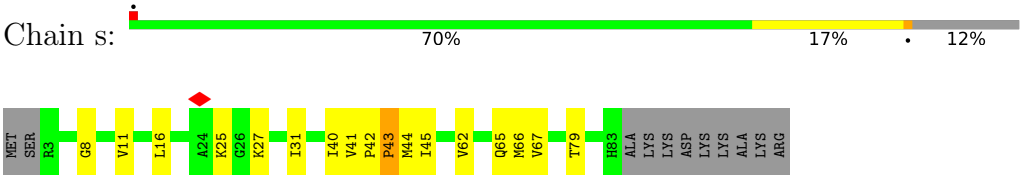
• Molecule 14: Small ribosomal subunit protein bS18c

Chain r:



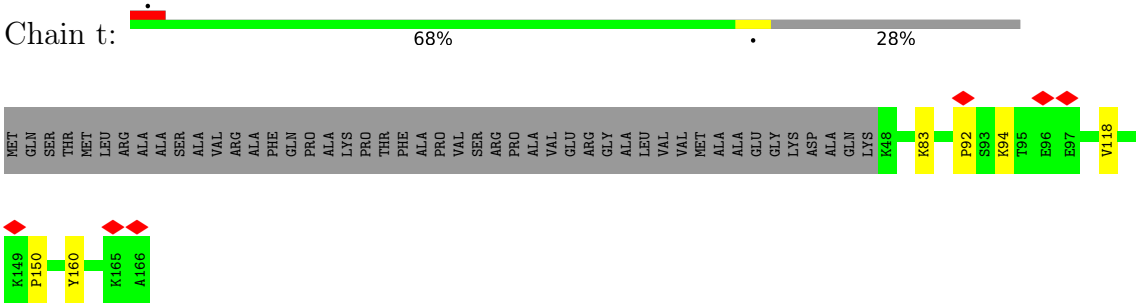
• Molecule 15: Small ribosomal subunit protein uS19c

Chain s:



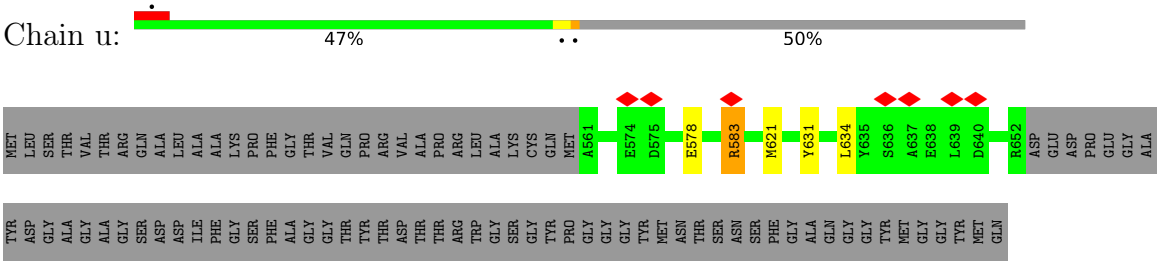
• Molecule 16: bS20c

Chain t:



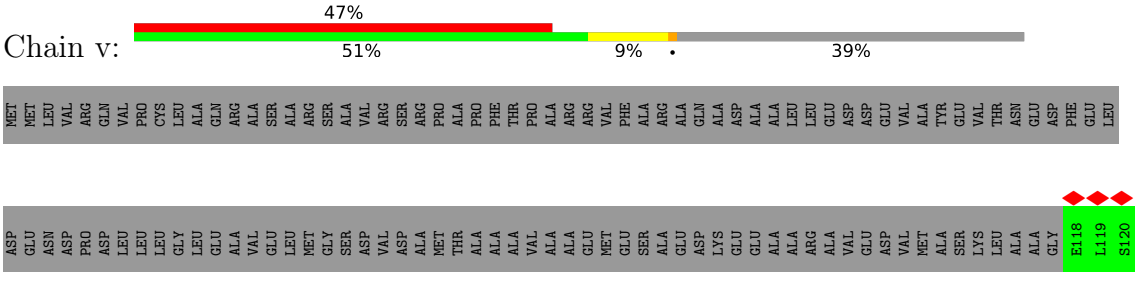
• Molecule 17: bS21c

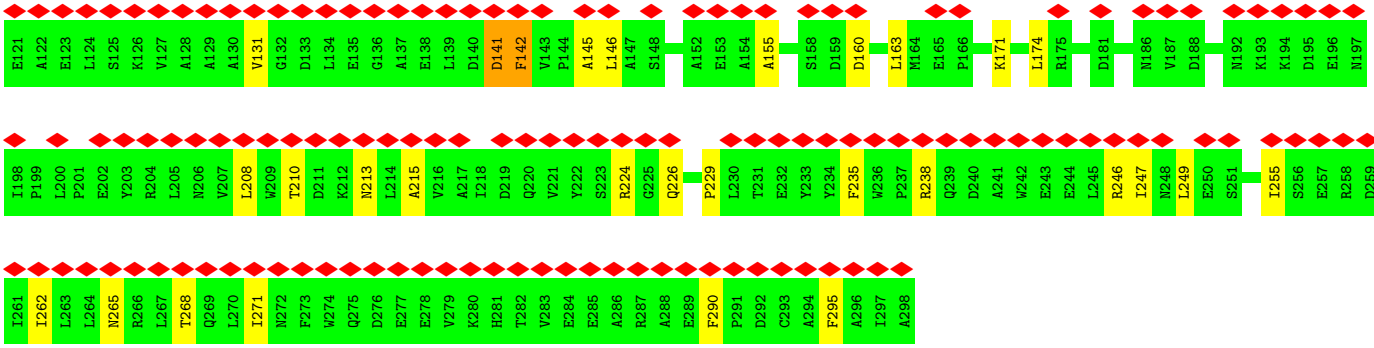
Chain u:



• Molecule 18: 30S ribosomal protein 3, chloroplastic

Chain v:



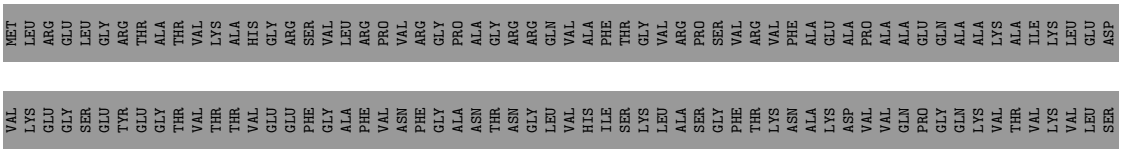


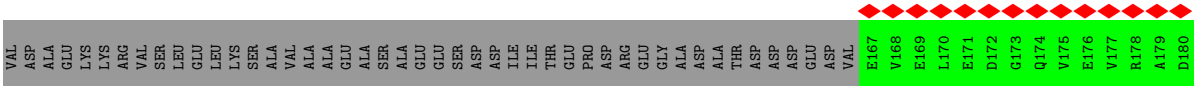
• Molecule 19: cS26/PSRP8

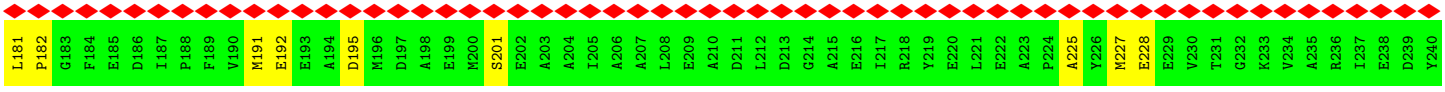
Chain x:

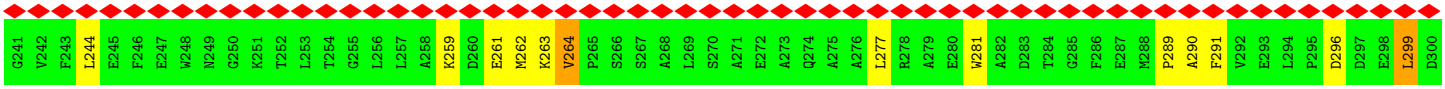
• Molecule 20: Plastid-specific ribosomal protein-7

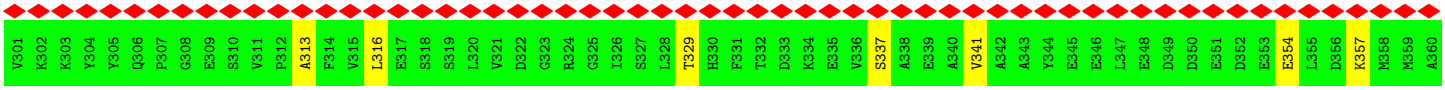
Chain w:

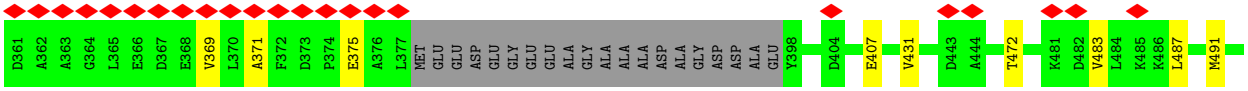


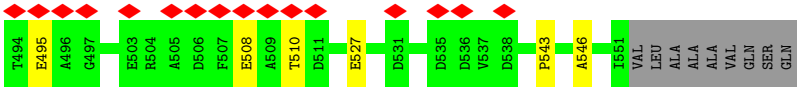






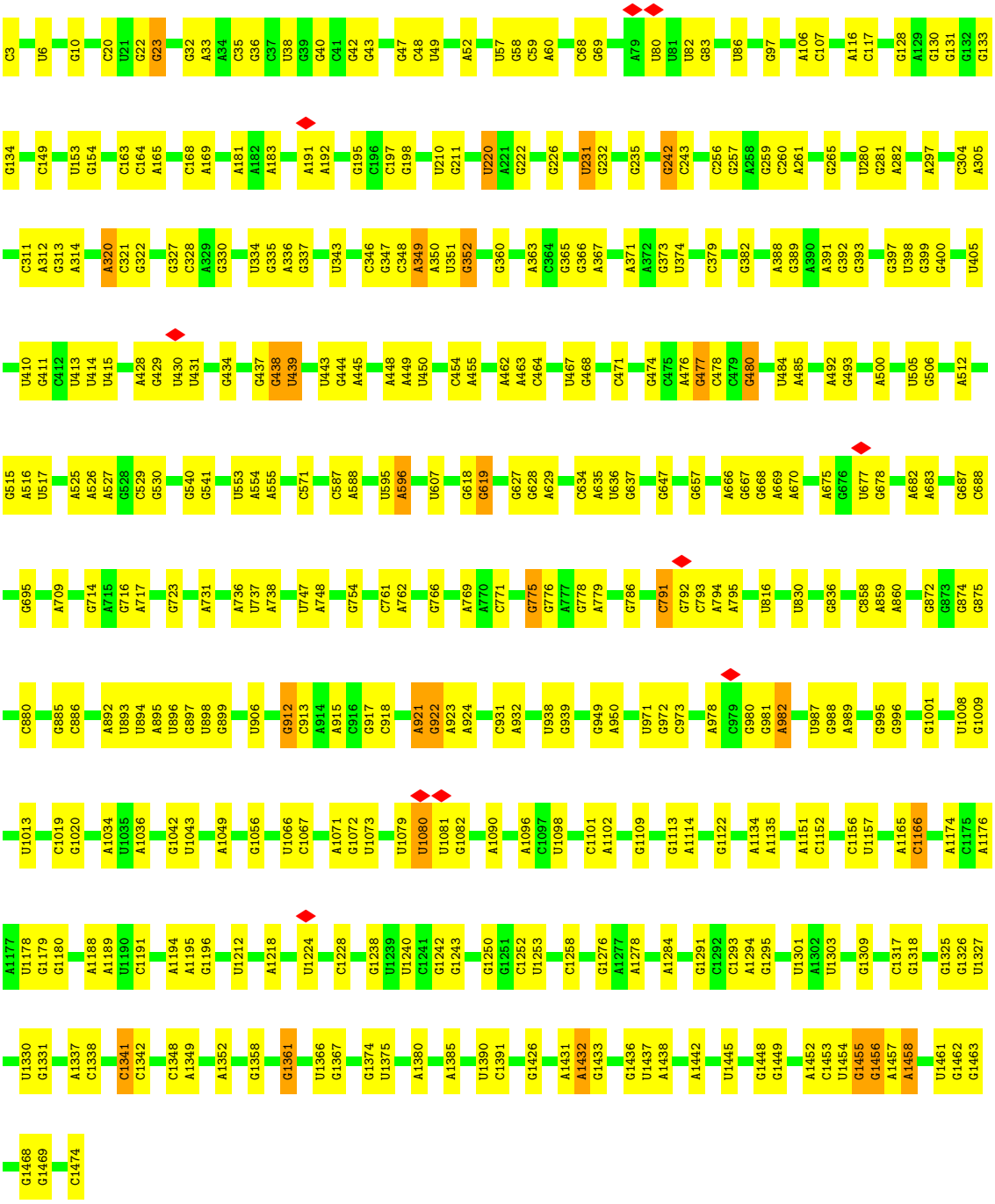






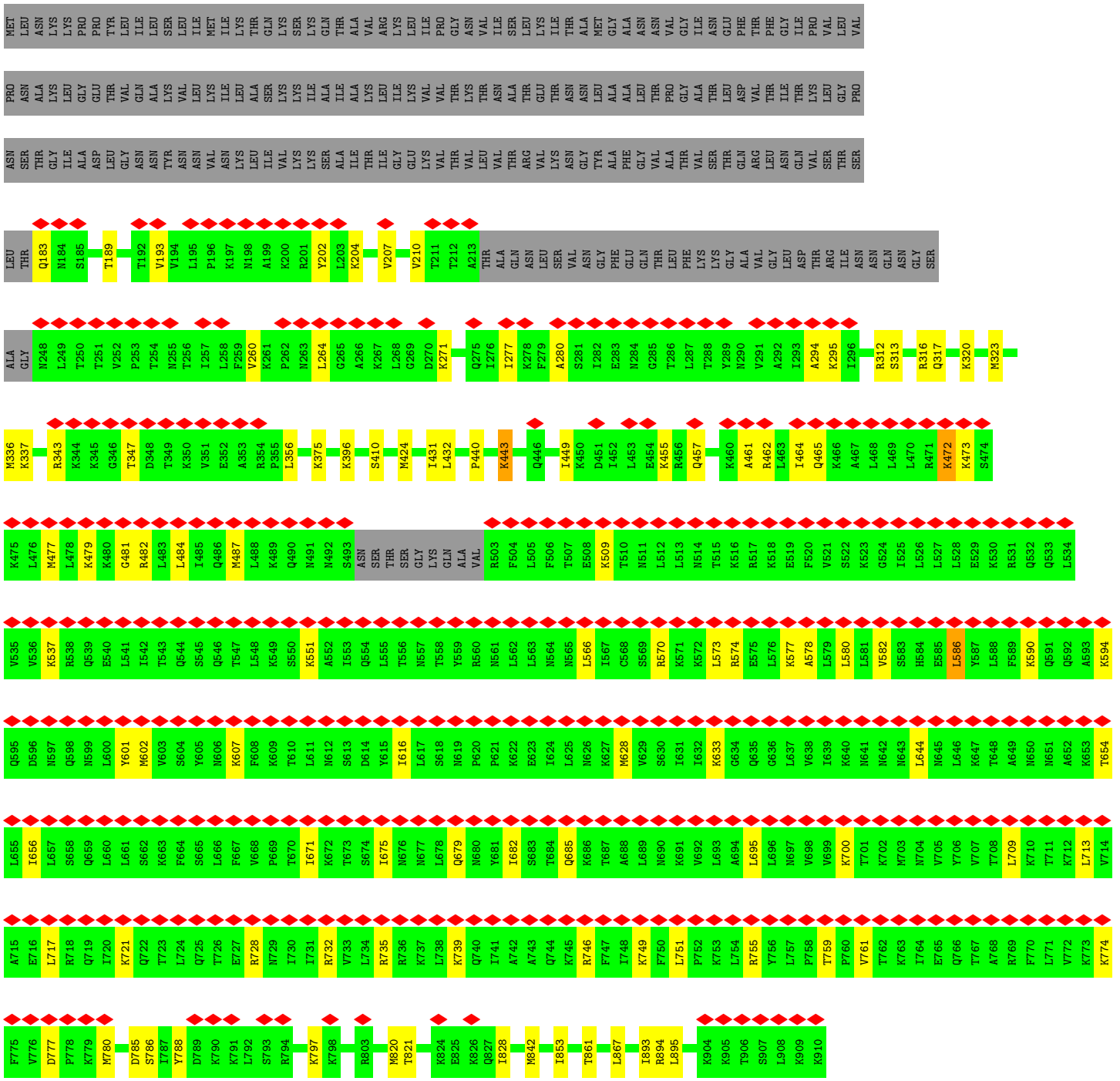
• Molecule 21: 16S rRNA

Chain 2:



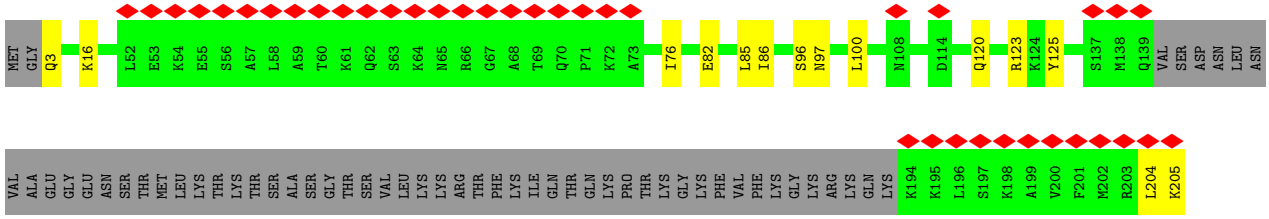
• Molecule 22: Small ribosomal subunit protein uS2c

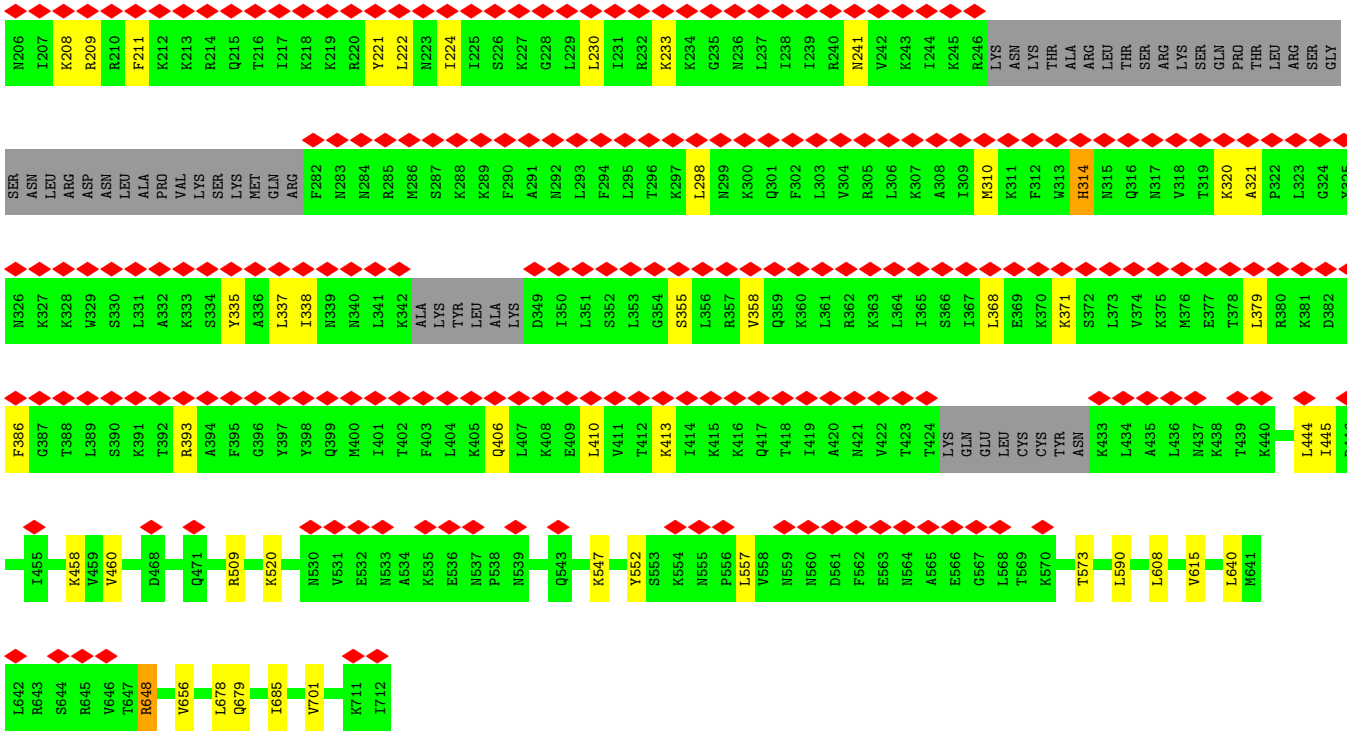
Chain b:



• Molecule 23: Small ribosomal subunit protein uS3c

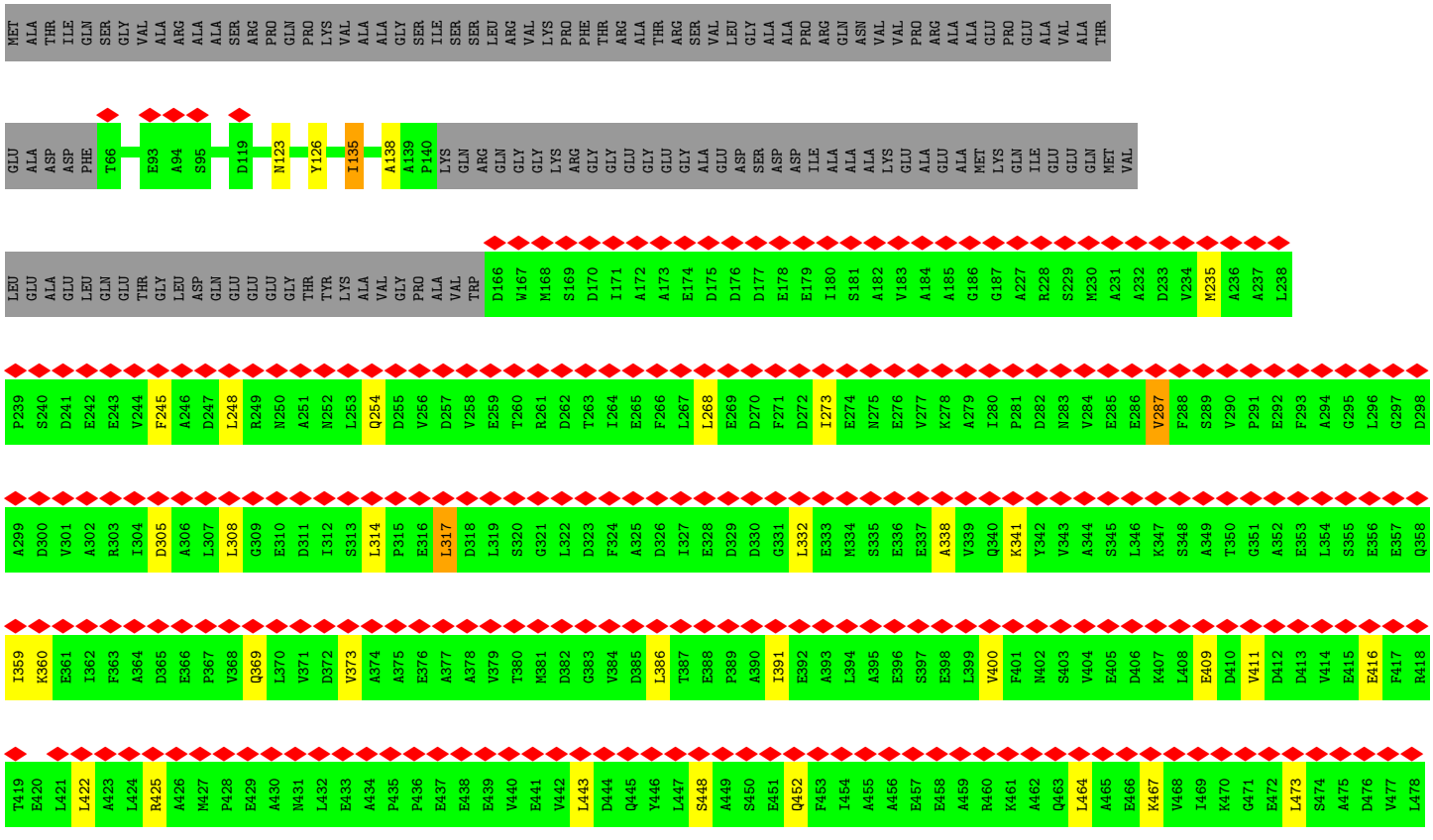
Chain c:

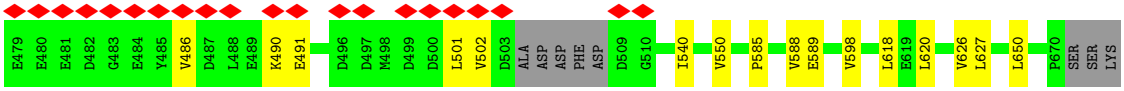




- Molecule 24: uS5c

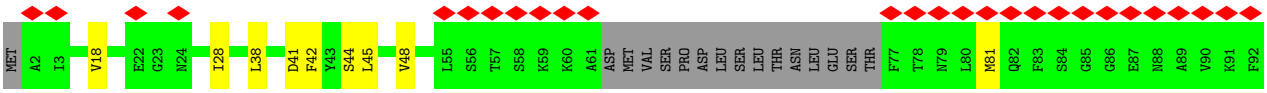
Chain e:

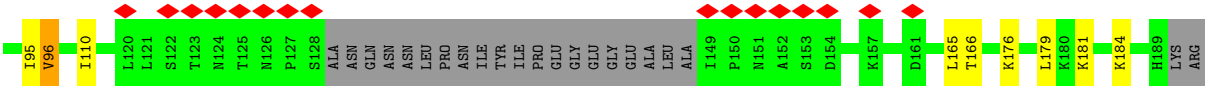




• Molecule 25: Small ribosomal subunit protein uS9c

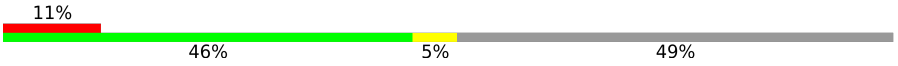
Chain i:

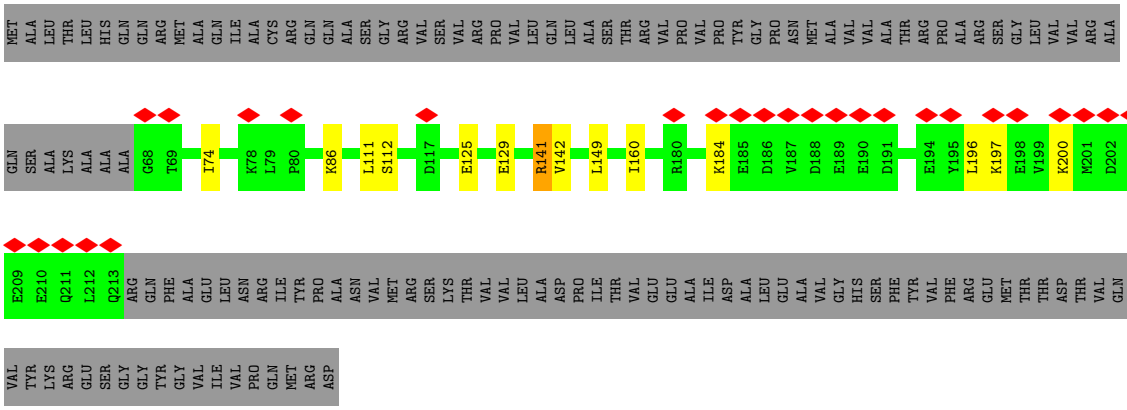




• Molecule 26: Sigma 54 modulation/S30EA ribosomal protein C-terminal domain-containing protein

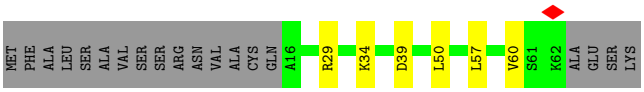
Chain y:





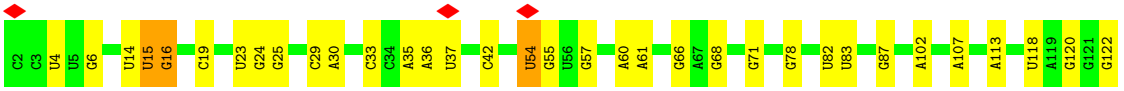
• Molecule 27: cL38/PSRP6

Chain 0:



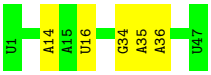
• Molecule 28: 5S rRNA

Chain 3:



• Molecule 29: 3S rRNA

Chain 5:

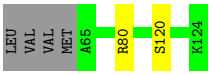


• Molecule 30: bL33c

Chain 6:

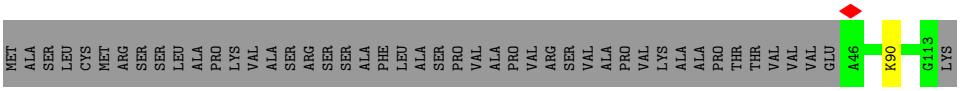
• Molecule 31: bL34c

Chain 7:



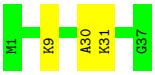
• Molecule 32: 50S ribosomal protein L35

Chain 8:



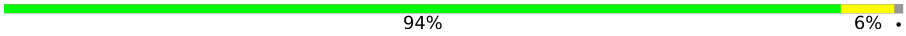
• Molecule 33: Large ribosomal subunit protein bL36c

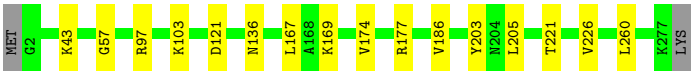
Chain 9:



• Molecule 34: Large ribosomal subunit protein uL2c

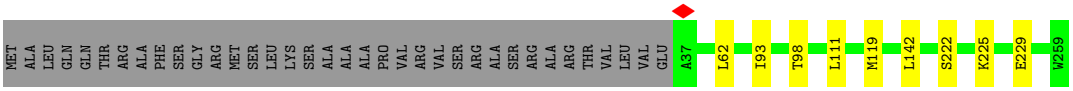
Chain B:





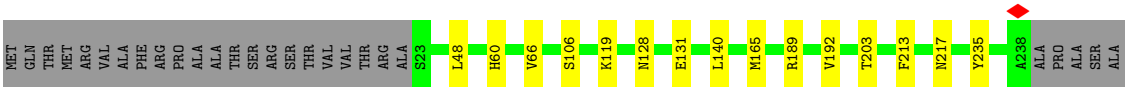
• Molecule 35: Large ribosomal subunit protein uL3c

Chain C:



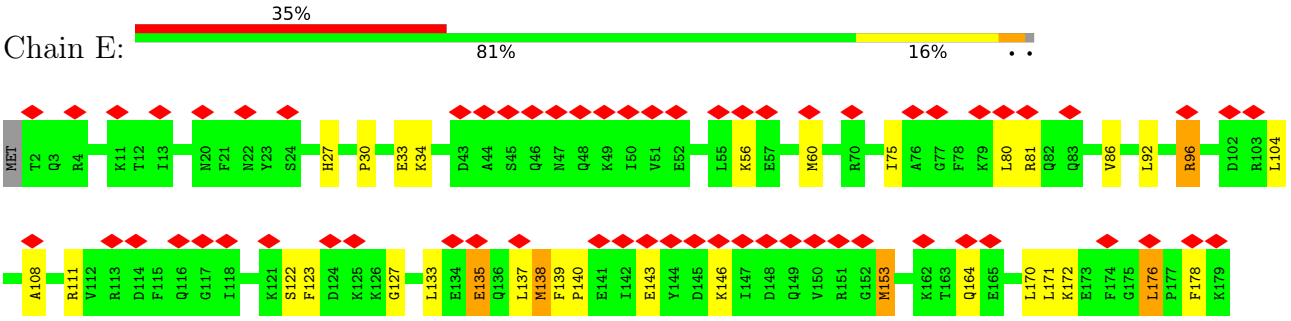
• Molecule 36: Large ribosomal subunit protein uL4c

Chain D:



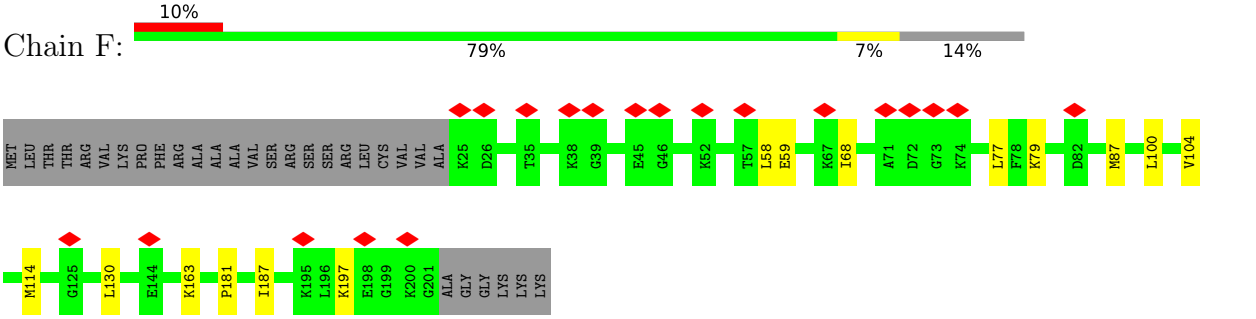
• Molecule 37: Large ribosomal subunit protein uL5c

Chain E:



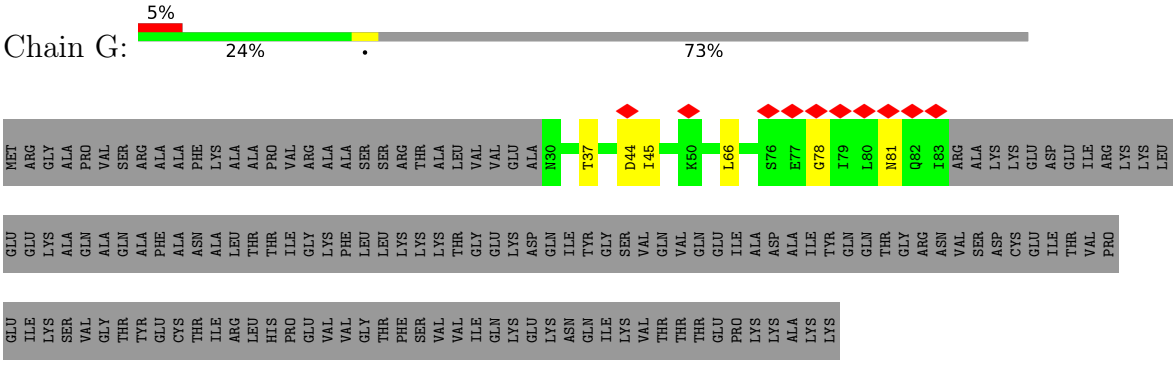
• Molecule 38: Plastid ribosomal protein L6

Chain F:



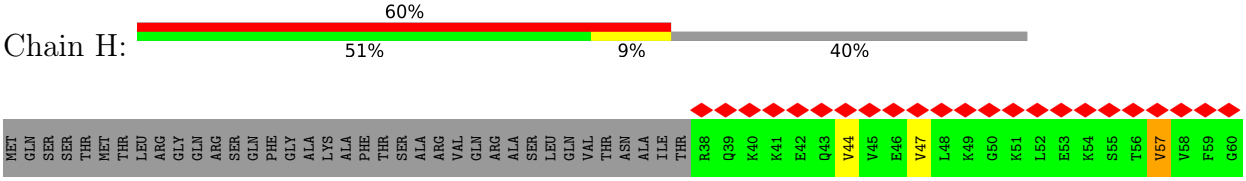
• Molecule 39: Large ribosomal subunit protein bL9c

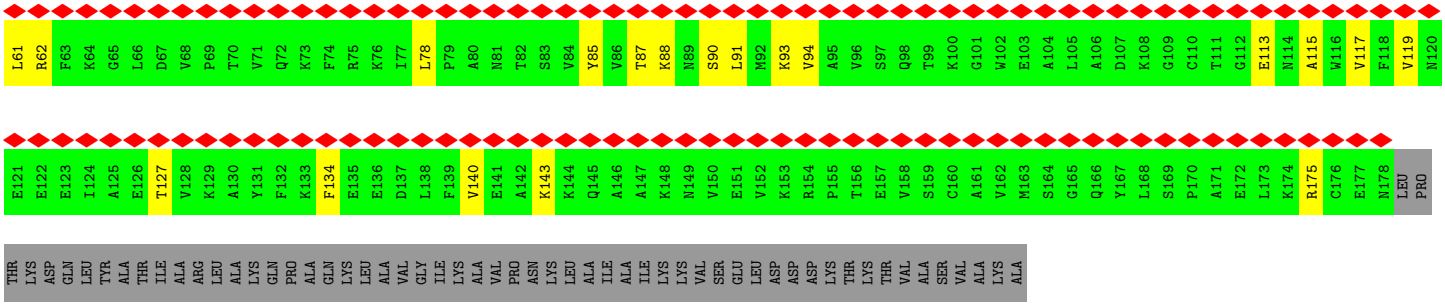
Chain G:



• Molecule 40: uL10c

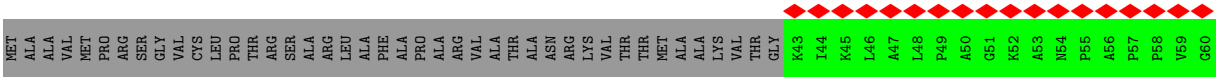
Chain H:





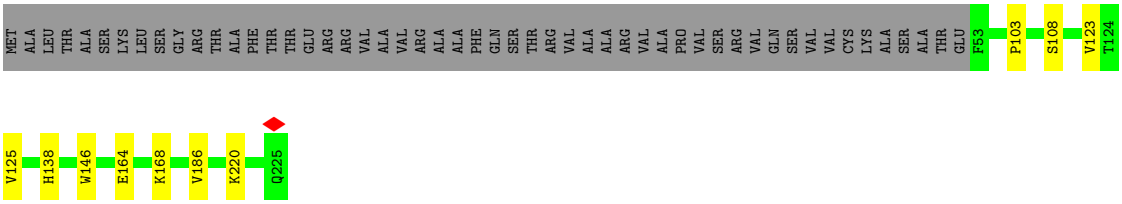
• Molecule 41: Large ribosomal subunit protein uL11c

Chain I:



• Molecule 42: uL13c

Chain J:

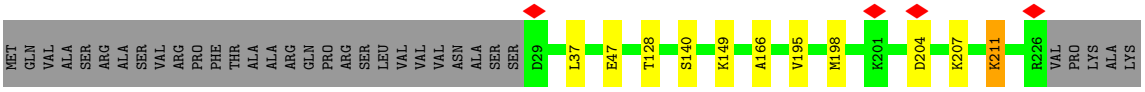


• Molecule 43: Large ribosomal subunit protein uL14c

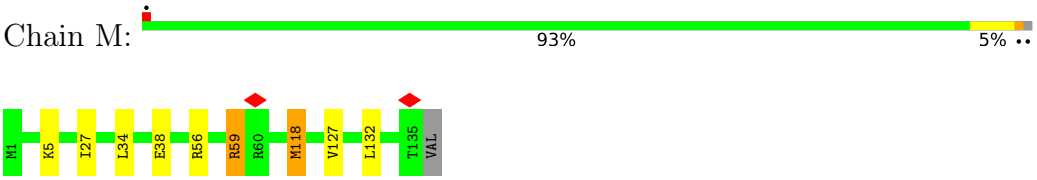
Chain K:

• Molecule 44: uL15c

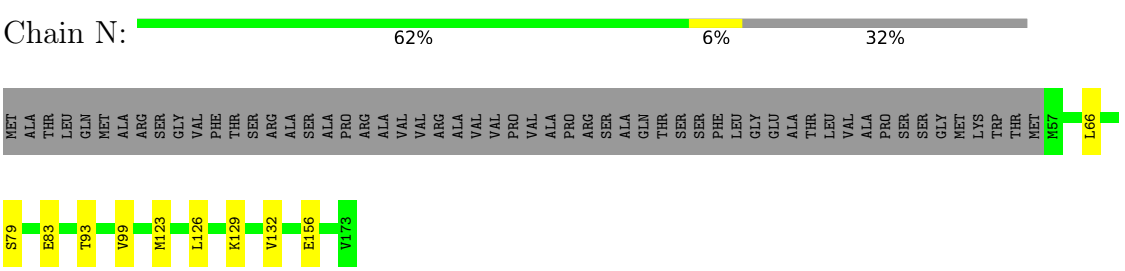
Chain L:



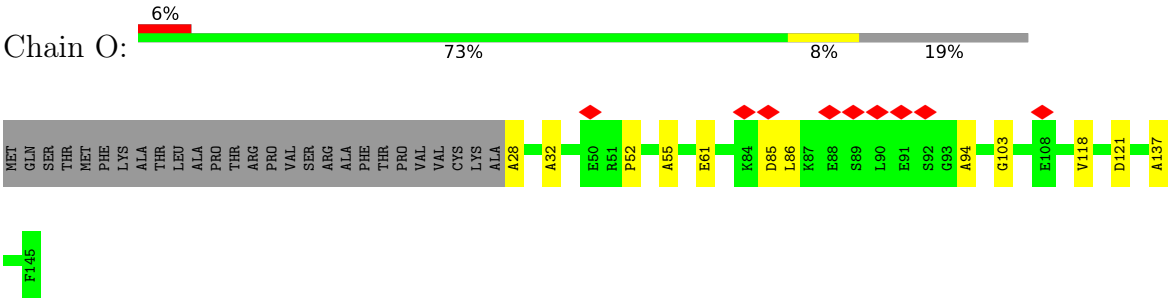
• Molecule 45: Large ribosomal subunit protein uL16c



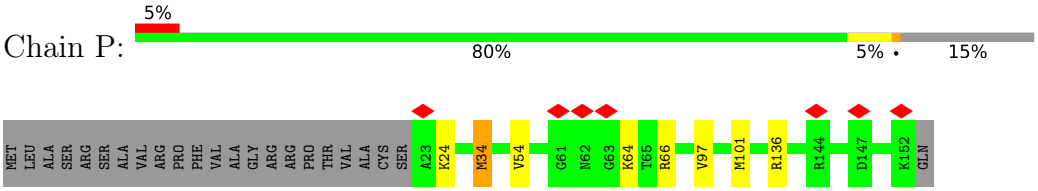
• Molecule 46: Large ribosomal subunit protein bL17c



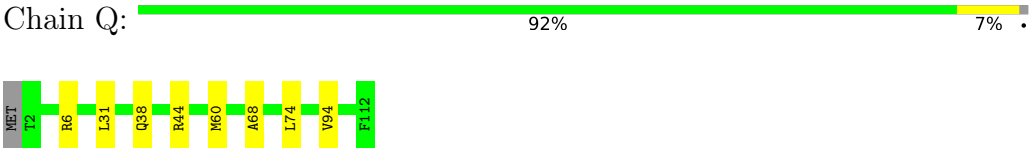
• Molecule 47: Large ribosomal subunit protein uL18c



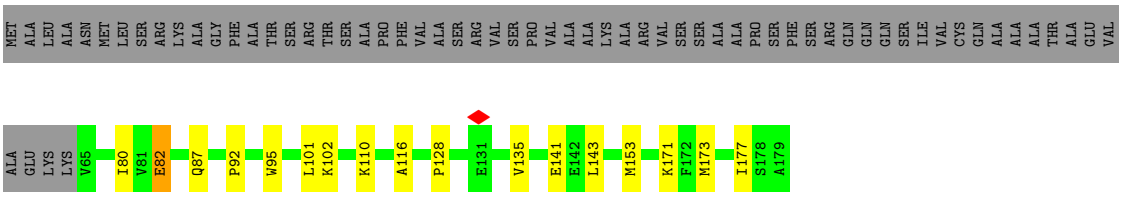
• Molecule 48: bL19c



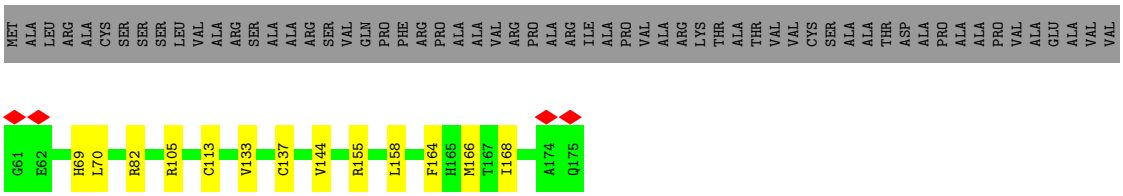
• Molecule 49: Large ribosomal subunit protein bL20c



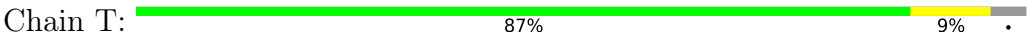
• Molecule 50: bL21c

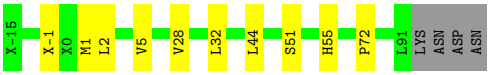


• Molecule 51: Large ribosomal subunit protein uL22c

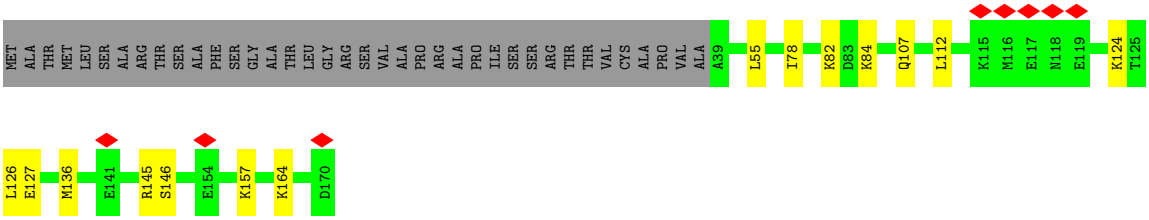


• Molecule 52: uL23c,Large ribosomal subunit protein uL23c

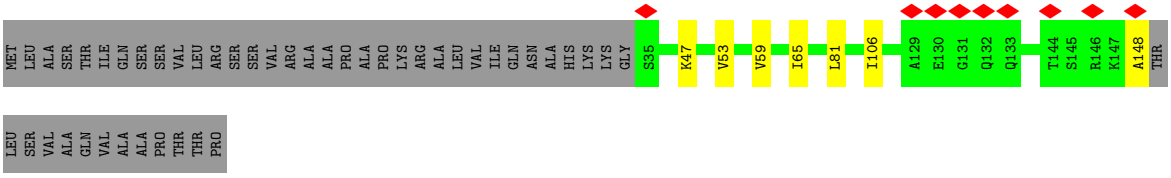




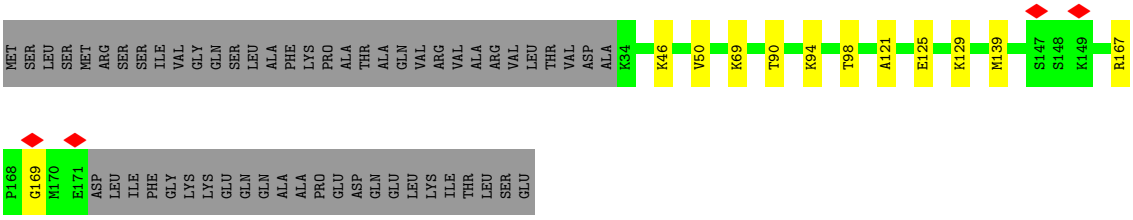
• Molecule 53: KOW domain-containing protein



• Molecule 54: bL27c

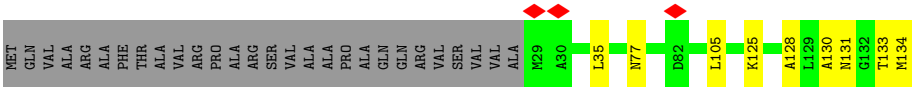


• Molecule 55: Large ribosomal subunit protein bL28c



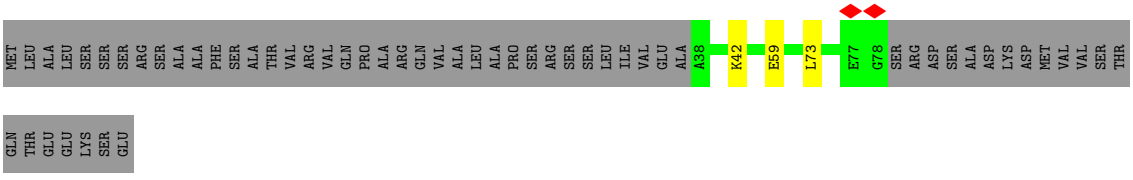
• Molecule 56: uL29c

Chain X:



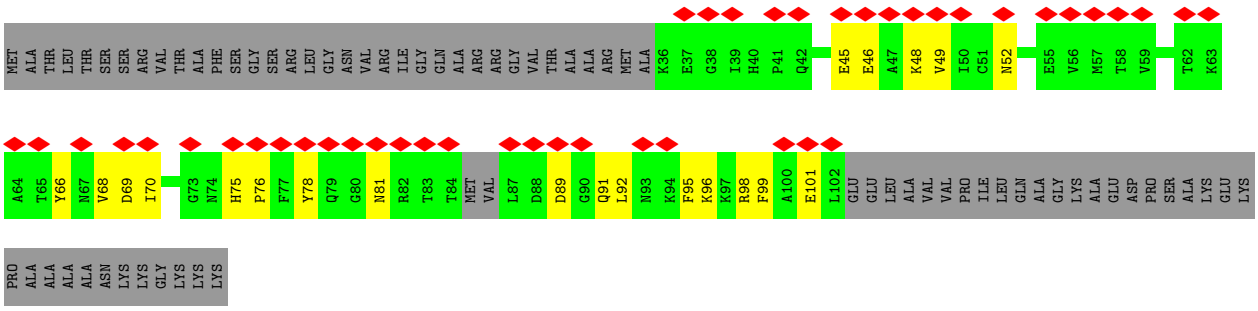
• Molecule 57: bL32c

Chain Z:



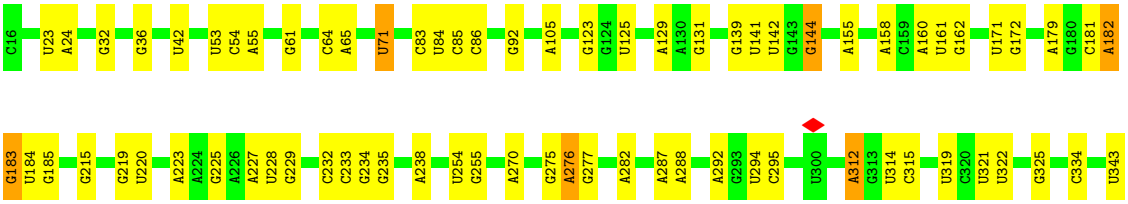
• Molecule 58: 50S ribosomal protein L31

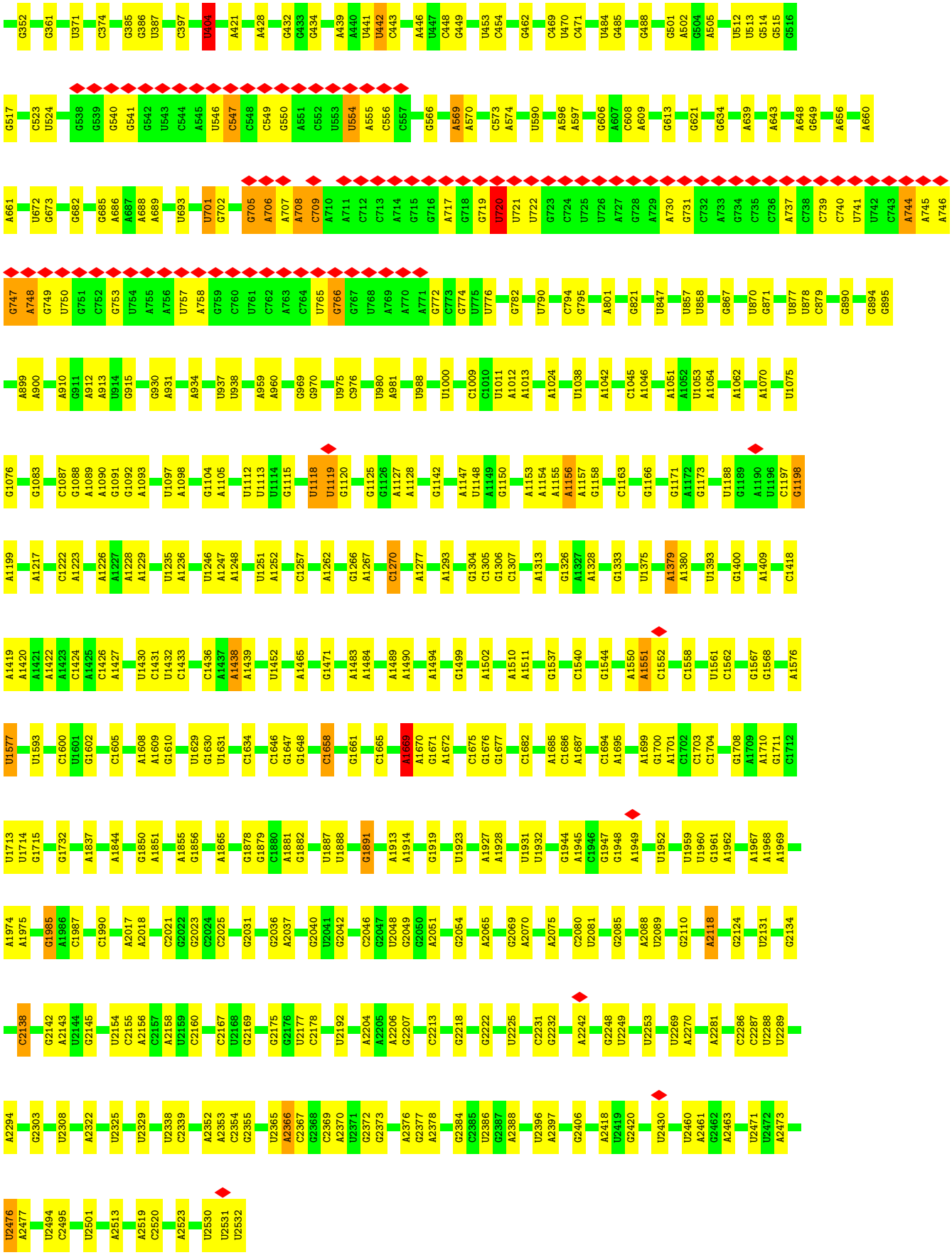
Chain Y:



• Molecule 59: 23S rRNA

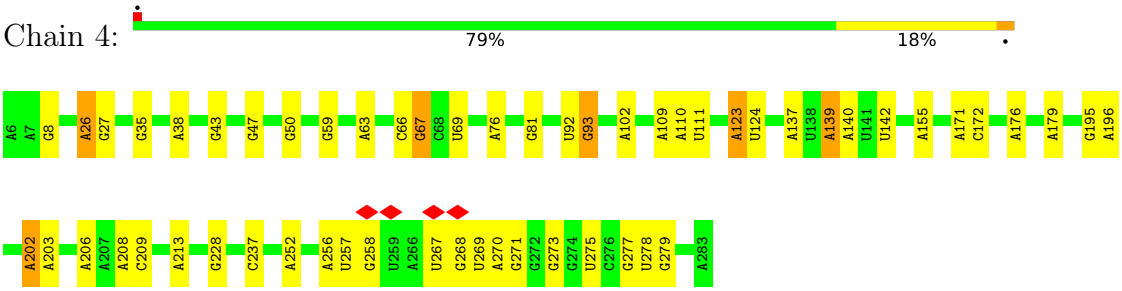
Chain 1:




G352 G361 U371 C374 G385 G386 U387 C397 U404 A421 A428 G432 G433 G434 A439 A440 U441 U442 C443 A446 U447 C448 G449 U453 C454 G462 C469 U470 C471 U484 G485 G488 G501 A502 G504 A505 U512 U513 G514 G515 G516
G517 C523 U524 G538 G539 G540 G541 G542 U543 C544 A545 U546 C547 C548 C549 G550 A551 C552 U553 U554 A555 C556 C557 G566 A569 A570 C573 A574 U590 A596 A597 G606 A607 C608 A609 G613 G621 G634 A639 A643 A648 G649 A656 A660
A661 U672 G673 G682 G685 A686 A687 A688 A689 U693 U701 G702 G705 A706 A707 A708 C709 A710 A711 C712 C713 A714 G715 G716 A717 G718 G719 U720 U721 U722 G723 C724 U725 U726 A727 G728 A729 A730 G731 C732 A733 G734 C735 C736 A737 C738 C739 C740 U741 U742 C743 A744 A745 A746
G747 A748 G749 U750 G751 C752 G753 U754 A755 A756 U757 A758 G759 C760 U761 C762 A763 C764 U765 G766 G767 U768 A769 A770 A771 G772 C773 G774 U775 U776 G782 U790 C794 G795 A801 G821 U847 U857 U858 G867 U870 G871 U877 U878 C879 G890 G894 G895
A899 A900 A910 G911 A912 A913 U914 G915 G930 A931 A934 U937 U938 A959 A960 G969 G970 U975 C976 U980 A981 U988 U1000 C1009 C1010 U1011 A1012 A1013 A1024 U1038 A1042 C1045 A1046 A1051 A1062 U1053 A1054 A1062 A1070 U1075
G1076 G1083 C1087 G1088 A1089 A1090 G1091 G1092 A1093 U1097 A1098 G1104 A1105 U1112 U1113 U1114 G1115 U1118 U1119 G1120 G1125 G1126 A1127 A1128 G1142 A1147 U1148 A1149 G1150 A1153 A1154 A1155 A1156 A1157 G1158 C1163 G1166 G1171 A1172 G1173 U1188 G1189 A1190 U1196 C1197 G1198
A1199 A1217 C1222 A1223 A1226 A1227 A1228 A1229 U1235 A1236 U1246 A1247 A1248 U1251 A1252 C1257 A1262 G1266 A1267 C1270 A1277 A1293 C1304 C1305 G1306 C1307 A1313 G1326 A1327 A1328 G1333 U1375 A1379 A1380 U1393 G1400 A1409 C1418
A1419 A1420 A1421 A1422 A1423 C1424 A1425 C1426 A1427 U1430 C1431 U1432 C1433 C1436 A1437 A1438 A1439 U1452 A1465 G1471 A1483 A1484 A1489 A1490 A1494 G1499 A1502 A1510 A1511 G1537 C1540 G1544 A1550 A1551 C1552 C1558 U1561 C1562 G1567 G1568 A1576
U1577 U1593 C1600 U1601 G1602 C1605 A1608 A1609 G1610 U1629 G1630 U1631 C1634 C1646 G1647 G1648 C1658 G1661 C1665 A1669 A1670 G1671 A1672 C1675 G1676 G1677 C1682 A1685 C1686 A1687 C1694 A1695 A1699 G1700 A1701 C1702 C1703 C1704 G1708 A1709 A1710 G1711 C1712
U1713 U1714 G1715 G1732 A1837 A1844 G1850 A1851 A1855 G1856 A1865 G1878 G1879 C1880 A1881 G1882 U1887 U1888 G1891 A1913 A1914 G1919 U1923 A1927 A1928 U1931 U1932 G1944 A1945 C1946 G1947 G1948 A1949 U1952 U1959 U1960 G1961 A1962 A1967 A1968 A1969
A1974 A1975 G1985 A1986 C1987 C1990 A2017 A2018 C2021 G2022 G2023 C2024 C2025 G2031 G2036 A2037 G2040 U2041 G2042 C2046 G2047 U2048 G2049 G2050 A2051 G2054 A2065 G2069 A2070 A2075 C2080 U2081 G2085 A2088 U2089 G2110 A2118 G2124 U2131 G2134
C2138 G2142 A2143 U2144 G2145 U2154 C2155 A2156 C2157 A2158 U2159 C2160 C2167 U2168 G2169 G2175 G2176 U2177 C2178 U2192 A2204 A2205 A2206 G2207 C2213 G2218 G2222 U2225 C2231 G2232 A2242 G2248 U2249 U2253 U2269 A2270 A2281 C2286 C2287 U2288 U2289
A2294 G2303 U2308 A2322 U2325 U2329 U2338 C2339 A2352 A2353 C2354 G2355 U2365 A2366 C2367 G2368 C2369 A2370 U2371 G2372 G2373 A2376 G2377 A2378 G2384 C2385 U2386 G2387 A2388 U2396 A2397 G2406 A2418 U2419 G2420 U2430 U2460 A2461 G2462 A2463 U2471 U2472 A2473
U2476 A2477 U2494 C2495 U2501 A2513 A2519 C2520 A2523 U2530 U2531 U2532

• Molecule 60: 7S rRNA

Chain 4:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	175058	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	40	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	75000	Depositor
Image detector	TFS FALCON 4i (4k x 4k)	Depositor
Maximum map value	1.538	Depositor
Minimum map value	-0.289	Depositor
Average map value	0.002	Depositor
Map value standard deviation	0.024	Depositor
Recommended contour level	0.107	Depositor
Map size (Å)	544.3072, 544.3072, 544.3072	wwPDB
Map dimensions	512, 512, 512	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.0631, 1.0631, 1.0631	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: UR3, OMG, OMC, OMU, K, MA6, 4OC, 6MZ, H2U, MG, 2MA, 5MC, 5MU, 2MG, G7M

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	0.22	0/1899	0.59	0/2570
2	d	0.17	0/2144	0.40	0/2867
3	f	0.14	0/868	0.35	0/1172
4	g	0.19	0/1354	0.47	0/1820
5	h	0.14	0/1125	0.36	0/1505
6	j	0.16	0/974	0.48	0/1316
7	k	0.17	0/908	0.42	0/1210
8	l	0.15	0/955	0.36	0/1282
9	m	0.19	0/931	0.47	0/1246
10	n	0.13	0/827	0.32	0/1097
11	o	0.18	0/822	0.42	0/1098
12	p	0.15	0/682	0.39	0/917
13	q	0.15	0/626	0.35	0/836
14	r	0.17	0/676	0.40	0/907
15	s	0.17	0/661	0.44	0/887
16	t	0.18	0/948	0.40	0/1269
17	u	0.19	0/801	0.70	3/1070 (0.3%)
18	v	0.25	0/1463	0.69	3/1994 (0.2%)
19	x	0.14	0/472	0.37	0/637
20	w	0.18	0/2835	0.43	0/3845
21	2	0.15	2/35103 (0.0%)	0.31	0/54745
22	b	0.22	0/5616	0.53	3/7512 (0.0%)
23	c	0.16	0/5008	0.42	1/6698 (0.0%)
24	e	0.16	0/4029	0.44	1/5461 (0.0%)
25	i	0.20	0/1202	0.54	0/1605
26	y	0.28	1/1168 (0.1%)	0.50	0/1570
27	0	0.20	0/382	0.37	0/518
28	3	0.18	0/2871	0.36	0/4471
29	5	0.22	0/1126	0.38	0/1753
30	6	0.19	0/479	0.39	0/640
31	7	0.23	0/457	0.47	0/595
32	8	0.21	0/528	0.39	0/702

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#|Z| >5	RMSZ	#|Z| >5
33	9	0.20	0/292	0.32	0/379
34	B	0.23	0/2200	0.42	0/2965
35	C	0.22	0/1711	0.41	0/2304
36	D	0.21	0/1619	0.40	0/2183
37	E	0.25	0/1433	0.63	2/1920 (0.1%)
38	F	0.17	0/1354	0.40	0/1821
39	G	0.20	0/424	0.46	0/570
40	H	0.19	0/1131	0.48	0/1520
41	I	2.27	3/992 (0.3%)	0.97	6/1336 (0.4%)
42	J	0.20	0/1375	0.40	0/1855
43	K	0.21	0/952	0.41	0/1280
44	L	0.21	0/1505	0.46	0/2009
45	M	0.19	0/1105	0.39	0/1482
46	N	0.22	0/951	0.43	0/1275
47	O	0.19	0/913	0.52	0/1222
48	P	0.18	0/1005	0.37	0/1351
49	Q	0.25	0/958	0.43	0/1272
50	R	0.21	0/927	0.39	0/1247
51	S	0.20	0/915	0.43	0/1221
52	T	0.22	0/772	0.44	0/1043
53	U	0.18	0/1036	0.35	0/1381
54	V	0.20	0/884	0.44	0/1187
55	W	0.19	0/1126	0.40	0/1507
56	X	0.20	0/853	0.36	0/1141
57	Z	0.21	0/328	0.39	0/436
58	Y	0.29	0/532	0.69	0/715
59	1	0.53	6/56765 (0.0%)	0.38	4/88499 (0.0%)
60	4	0.24	0/6566	0.37	0/10240
All	All	0.38	12/170564 (0.0%)	0.40	23/251176 (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
1	a	0	1
6	j	0	1
17	u	0	1
18	v	0	1
26	y	0	1
44	L	0	1

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Mol	Chain	#Chirality outliers	#Planarity outliers
59	1	2	0
All	All	2	6

The worst 5 of 12 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
41	I	162	MET	CA-C	70.08	2.45	1.52
59	1	720	U	N3-C4	50.68	2.39	1.38
59	1	720	U	C2-N3	47.91	2.33	1.37
59	1	720	U	N1-C2	47.81	2.34	1.38
59	1	720	U	N1-C6	45.43	2.28	1.38

The worst 5 of 23 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
41	I	162	MET	O-C-N	-18.55	97.64	122.49
41	I	162	MET	CB-CA-C	13.76	134.34	109.29
17	u	583	ARG	CB-CG-CD	11.32	137.34	111.30
41	I	162	MET	CA-C-O	9.23	129.30	119.14
41	I	162	MET	N-CA-C	8.91	124.46	113.50

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
59	1	312	A	C1'
59	1	1379	A	C1'

5 of 6 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	a	291	VAL	Peptide
6	j	122	HIS	Peptide
17	u	583	ARG	Sidechain
18	v	141	ASP	Peptide
26	y	141	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	1868	0	1762	20	0
2	d	2107	0	2303	16	0
3	f	850	0	852	7	0
4	g	1334	0	1441	9	0
5	h	1113	0	1184	13	0
6	j	957	0	968	10	0
7	k	894	0	956	10	0
8	l	941	0	1029	7	0
9	m	924	0	971	32	0
10	n	814	0	877	7	0
11	o	813	0	828	4	0
12	p	666	0	697	7	0
13	q	621	0	658	5	0
14	r	664	0	743	6	0
15	s	645	0	677	24	0
16	t	935	0	1008	3	0
17	u	789	0	794	4	0
18	v	1430	0	1333	18	0
19	x	462	0	480	1	0
20	w	2786	0	2612	27	0
21	2	31537	0	15884	168	0
22	b	5545	0	6140	68	0
23	c	4939	0	5339	41	0
24	e	3988	0	3837	35	0
25	i	1189	0	1243	6	0
26	y	1155	0	1181	11	0
27	0	369	0	381	4	0
28	3	2571	0	1300	11	0
29	5	1006	0	508	1	0
30	6	473	0	498	3	0
31	7	455	0	500	0	0
32	8	520	0	543	0	0
33	9	292	0	332	3	0
34	B	2159	0	2239	7	0
35	C	1681	0	1736	4	0
36	D	1599	0	1659	9	0
37	E	1413	0	1479	17	0
38	F	1338	0	1434	7	0
39	G	418	0	456	2	0
40	H	1114	0	1149	11	0
41	I	980	0	1056	34	0
42	J	1346	0	1389	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
43	K	942	0	998	5	0
44	L	1484	0	1530	6	0
45	M	1080	0	1143	5	0
46	N	937	0	978	4	0
47	O	902	0	920	6	0
48	P	995	0	1057	5	0
49	Q	943	0	992	7	0
50	R	907	0	951	11	0
51	S	903	0	948	7	0
52	T	837	0	823	6	0
53	U	1020	0	1097	8	0
54	V	869	0	882	4	0
55	W	1104	0	1151	6	0
56	X	843	0	884	6	0
57	Z	323	0	367	2	0
58	Y	521	0	498	45	0
59	1	50934	0	25627	210	0
60	4	5856	0	2947	25	0
61	1	86	0	0	0	0
61	2	47	0	0	0	0
61	4	4	0	0	0	0
61	U	1	0	0	0	0
62	1	205	0	0	0	0
62	2	98	0	0	0	0
62	3	5	0	0	0	0
62	4	7	0	0	0	0
62	5	4	0	0	0	0
62	D	1	0	0	0	0
62	L	1	0	0	0	0
62	N	1	0	0	0	0
All	All	159560	0	116249	862	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 3.

The worst 5 of 862 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)
59:1:1577:5MU:C5	59:1:1577:5MU:C4	1.82	1.62
59:1:404:5MU:C5	59:1:404:5MU:C4	1.82	1.61
59:1:720:U:C6	59:1:720:U:C5	2.11	1.37

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
59:1:720:U:C5	59:1:720:U:C4	2.25	1.24
41:I:162:MET:HA	59:1:720:U:C2	1.77	1.19

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	234/436 (54%)	225 (96%)	8 (3%)	1 (0%)	30 52
2	d	254/257 (99%)	248 (98%)	6 (2%)	0	100 100
3	f	101/171 (59%)	99 (98%)	2 (2%)	0	100 100
4	g	165/168 (98%)	160 (97%)	5 (3%)	0	100 100
5	h	139/141 (99%)	134 (96%)	5 (4%)	0	100 100
6	j	120/169 (71%)	114 (95%)	3 (2%)	3 (2%)	4 8
7	k	115/130 (88%)	113 (98%)	2 (2%)	0	100 100
8	l	119/133 (90%)	113 (95%)	6 (5%)	0	100 100
9	m	112/164 (68%)	110 (98%)	2 (2%)	0	100 100
10	n	97/100 (97%)	97 (100%)	0	0	100 100
11	o	99/141 (70%)	96 (97%)	3 (3%)	0	100 100
12	p	78/128 (61%)	78 (100%)	0	0	100 100
13	q	76/105 (72%)	74 (97%)	2 (3%)	0	100 100
14	r	79/137 (58%)	76 (96%)	3 (4%)	0	100 100
15	s	79/92 (86%)	79 (100%)	0	0	100 100
16	t	117/166 (70%)	116 (99%)	1 (1%)	0	100 100
17	u	90/184 (49%)	87 (97%)	3 (3%)	0	100 100
18	v	179/298 (60%)	162 (90%)	14 (8%)	3 (2%)	7 16

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
19	x	58/120 (48%)	57 (98%)	1 (2%)	0	100	100
20	w	361/560 (64%)	351 (97%)	10 (3%)	0	100	100
22	b	679/910 (75%)	658 (97%)	20 (3%)	1 (0%)	48	71
23	c	597/712 (84%)	584 (98%)	13 (2%)	0	100	100
24	e	528/673 (78%)	505 (96%)	22 (4%)	1 (0%)	44	66
25	i	147/191 (77%)	132 (90%)	14 (10%)	1 (1%)	19	38
26	y	144/286 (50%)	142 (99%)	2 (1%)	0	100	100
27	0	45/66 (68%)	45 (100%)	0	0	100	100
30	6	56/101 (55%)	56 (100%)	0	0	100	100
31	7	58/124 (47%)	57 (98%)	1 (2%)	0	100	100
32	8	66/114 (58%)	64 (97%)	2 (3%)	0	100	100
33	9	35/37 (95%)	34 (97%)	1 (3%)	0	100	100
34	B	274/278 (99%)	270 (98%)	4 (2%)	0	100	100
35	C	221/259 (85%)	217 (98%)	4 (2%)	0	100	100
36	D	214/243 (88%)	213 (100%)	1 (0%)	0	100	100
37	E	176/179 (98%)	169 (96%)	7 (4%)	0	100	100
38	F	175/207 (84%)	170 (97%)	5 (3%)	0	100	100
39	G	52/200 (26%)	52 (100%)	0	0	100	100
40	H	139/235 (59%)	135 (97%)	4 (3%)	0	100	100
41	I	130/176 (74%)	125 (96%)	5 (4%)	0	100	100
42	J	171/225 (76%)	165 (96%)	6 (4%)	0	100	100
43	K	120/122 (98%)	117 (98%)	3 (2%)	0	100	100
44	L	196/241 (81%)	190 (97%)	6 (3%)	0	100	100
45	M	133/136 (98%)	130 (98%)	3 (2%)	0	100	100
46	N	115/173 (66%)	112 (97%)	3 (3%)	0	100	100
47	O	116/145 (80%)	114 (98%)	2 (2%)	0	100	100
48	P	128/153 (84%)	123 (96%)	5 (4%)	0	100	100
49	Q	109/112 (97%)	109 (100%)	0	0	100	100
50	R	113/179 (63%)	112 (99%)	1 (1%)	0	100	100
51	S	113/175 (65%)	111 (98%)	2 (2%)	0	100	100
52	T	90/111 (81%)	88 (98%)	2 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
53	U	130/170 (76%)	129 (99%)	1 (1%)	0	100	100
54	V	112/161 (70%)	109 (97%)	3 (3%)	0	100	100
55	W	136/195 (70%)	134 (98%)	2 (2%)	0	100	100
56	X	104/134 (78%)	104 (100%)	0	0	100	100
57	Z	39/98 (40%)	37 (95%)	2 (5%)	0	100	100
58	Y	61/136 (45%)	51 (84%)	10 (16%)	0	100	100
All	All	8394/11457 (73%)	8152 (97%)	232 (3%)	10 (0%)	50	71

5 of 10 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
6	j	123	VAL
1	a	71	VAL
6	j	50	VAL
6	j	51	ASP
18	v	142	PHE

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	206/368 (56%)	202 (98%)	4 (2%)	52	75
2	d	233/234 (100%)	226 (97%)	7 (3%)	36	63
3	f	89/140 (64%)	88 (99%)	1 (1%)	70	86
4	g	146/147 (99%)	144 (99%)	2 (1%)	62	82
5	h	125/125 (100%)	122 (98%)	3 (2%)	44	70
6	j	107/143 (75%)	104 (97%)	3 (3%)	38	65
7	k	93/105 (89%)	91 (98%)	2 (2%)	47	72
8	l	103/111 (93%)	100 (97%)	3 (3%)	37	64
9	m	101/138 (73%)	101 (100%)	0	100	100
10	n	88/89 (99%)	87 (99%)	1 (1%)	70	86

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
11	o	86/115 (75%)	84 (98%)	2 (2%)	45	71
12	p	69/108 (64%)	69 (100%)	0	100	100
13	q	69/90 (77%)	69 (100%)	0	100	100
14	r	73/128 (57%)	72 (99%)	1 (1%)	62	82
15	s	71/80 (89%)	68 (96%)	3 (4%)	25	50
16	t	99/133 (74%)	98 (99%)	1 (1%)	73	88
17	u	85/149 (57%)	84 (99%)	1 (1%)	67	85
18	v	143/246 (58%)	142 (99%)	1 (1%)	81	93
19	x	50/95 (53%)	48 (96%)	2 (4%)	27	52
20	w	287/434 (66%)	279 (97%)	8 (3%)	38	65
22	b	620/807 (77%)	606 (98%)	14 (2%)	45	71
23	c	541/634 (85%)	533 (98%)	8 (2%)	60	81
24	e	411/527 (78%)	402 (98%)	9 (2%)	47	72
25	i	126/159 (79%)	120 (95%)	6 (5%)	21	44
26	y	124/238 (52%)	122 (98%)	2 (2%)	58	79
27	0	39/54 (72%)	38 (97%)	1 (3%)	41	67
30	6	53/90 (59%)	48 (91%)	5 (9%)	7	15
31	7	45/90 (50%)	43 (96%)	2 (4%)	24	48
32	8	55/92 (60%)	54 (98%)	1 (2%)	54	77
33	9	33/33 (100%)	33 (100%)	0	100	100
34	B	228/230 (99%)	223 (98%)	5 (2%)	47	72
35	C	176/204 (86%)	173 (98%)	3 (2%)	56	78
36	D	167/187 (89%)	165 (99%)	2 (1%)	67	85
37	E	156/157 (99%)	150 (96%)	6 (4%)	28	54
38	F	145/168 (86%)	142 (98%)	3 (2%)	48	73
39	G	46/167 (28%)	44 (96%)	2 (4%)	25	49
40	H	122/197 (62%)	116 (95%)	6 (5%)	21	43
41	I	106/138 (77%)	103 (97%)	3 (3%)	38	65
42	J	140/180 (78%)	136 (97%)	4 (3%)	37	64
43	K	101/101 (100%)	98 (97%)	3 (3%)	36	63
44	L	149/180 (83%)	147 (99%)	2 (1%)	65	84

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
45	M	110/111 (99%)	108 (98%)	2 (2%)	54 77
46	N	97/140 (69%)	95 (98%)	2 (2%)	48 73
47	O	93/116 (80%)	93 (100%)	0	100 100
48	P	104/122 (85%)	101 (97%)	3 (3%)	37 64
49	Q	100/101 (99%)	98 (98%)	2 (2%)	50 74
50	R	97/145 (67%)	95 (98%)	2 (2%)	48 73
51	S	94/136 (69%)	90 (96%)	4 (4%)	25 49
52	T	85/89 (96%)	83 (98%)	2 (2%)	44 70
53	U	109/137 (80%)	107 (98%)	2 (2%)	54 77
54	V	90/127 (71%)	89 (99%)	1 (1%)	70 86
55	W	116/164 (71%)	113 (97%)	3 (3%)	41 67
56	X	89/109 (82%)	88 (99%)	1 (1%)	70 86
57	Z	33/81 (41%)	32 (97%)	1 (3%)	36 63
58	Y	55/106 (52%)	54 (98%)	1 (2%)	54 77
All	All	7178/9495 (76%)	7020 (98%)	158 (2%)	47 72

5 of 158 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
40	H	85	TYR
51	S	133	VAL
40	H	175	ARG
44	L	128	THR
53	U	126	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 64 such sidechains are listed below:

Mol	Chain	Res	Type
53	U	77	GLN
54	V	127	GLN
23	c	462	ASN
23	c	215	GLN
55	W	45	ASN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
21	2	1468/1470 (99%)	202 (13%)	3 (0%)
28	3	120/121 (99%)	20 (16%)	1 (0%)
29	5	46/47 (97%)	3 (6%)	0
59	1	2362/2375 (99%)	331 (14%)	5 (0%)
60	4	270/272 (99%)	35 (12%)	1 (0%)
All	All	4266/4285 (99%)	591 (13%)	10 (0%)

5 of 591 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
21	2	6	U
21	2	10	G
21	2	20	C
21	2	23	G
21	2	32	G

5 of 10 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
59	1	1961	G
59	1	2396	U
60	4	277	G
28	3	15	U
59	1	484	U

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

19 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	$\#\|Z\| > 2$
21	UR3	2	1437	21	19,22,23	2.78	8 (42%)	26,32,35	1.33	2 (7%)
59	H2U	1	2089	59	18,21,22	0.52	0	21,30,33	0.92	1 (4%)
21	MA6	2	1458	21	18,26,27	1.25	3 (16%)	19,38,41	3.43	3 (15%)
59	2MA	1	2143	61,62,59	19,25,26	3.60	6 (31%)	21,37,40	2.27	4 (19%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
21	G7M	2	480	61,21	20,26,27	2.20	6 (30%)	17,39,42	1.32	3 (17%)
59	5MU	1	1577	61,59	19,22,23	7.65	9 (47%)	28,32,35	3.42	10 (35%)
59	2MG	1	1471	59	18,26,27	2.63	6 (33%)	16,38,41	1.53	4 (25%)
59	6MZ	1	1669	59	18,25,26	5.34	10 (55%)	16,36,39	3.56	4 (25%)
21	2MG	2	912	21	18,26,27	2.84	6 (33%)	16,38,41	1.57	3 (18%)
21	MA6	2	1457	21	18,26,27	1.19	3 (16%)	19,38,41	3.47	3 (15%)
21	5MC	2	913	21	18,22,23	3.62	7 (38%)	26,32,35	0.99	2 (7%)
59	2MG	1	2085	59	18,26,27	2.59	6 (33%)	16,38,41	1.36	3 (18%)
59	5MC	1	1600	61,59	18,22,23	3.48	7 (38%)	26,32,35	0.99	2 (7%)
21	4OC	2	1341	21	20,23,24	3.41	8 (40%)	26,32,35	0.87	1 (3%)
59	OMC	1	2138	62,59	19,22,23	2.85	8 (42%)	26,31,34	0.83	0
59	OMU	1	2192	61,59	19,22,23	3.02	8 (42%)	26,31,34	1.74	5 (19%)
59	5MU	1	404	59	19,22,23	7.68	8 (42%)	28,32,35	3.24	12 (42%)
21	2MG	2	1455	21	18,26,27	2.65	6 (33%)	16,38,41	1.73	4 (25%)
59	OMG	1	1891	61,59	18,26,27	2.48	8 (44%)	19,38,41	1.47	4 (21%)

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
21	UR3	2	1437	21	-	0/7/25/26	0/2/2/2
59	H2U	1	2089	59	-	0/7/38/39	0/2/2/2
21	MA6	2	1458	21	-	2/7/29/30	0/3/3/3
59	2MA	1	2143	61,62,59	-	2/3/25/26	0/3/3/3
21	G7M	2	480	61,21	-	3/3/25/26	0/3/3/3
59	5MU	1	1577	61,59	-	0/7/25/26	0/2/2/2
59	2MG	1	1471	59	-	0/5/27/28	0/3/3/3
59	6MZ	1	1669	59	-	2/5/27/28	0/3/3/3
21	2MG	2	912	21	-	0/5/27/28	0/3/3/3
21	MA6	2	1457	21	-	0/7/29/30	0/3/3/3
21	5MC	2	913	21	-	0/7/25/26	0/2/2/2
59	2MG	1	2085	59	-	1/5/27/28	0/3/3/3
59	5MC	1	1600	61,59	-	0/7/25/26	0/2/2/2
21	4OC	2	1341	21	-	1/9/29/30	0/2/2/2
59	OMC	1	2138	62,59	-	0/9/27/28	0/2/2/2
59	OMU	1	2192	61,59	-	0/9/27/28	0/2/2/2

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
59	5MU	1	404	59	-	1/7/25/26	0/2/2/2
21	2MG	2	1455	21	-	0/5/27/28	0/3/3/3
59	OMG	1	1891	61,59	-	3/5/27/28	0/3/3/3

The worst 5 of 123 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
59	1	1577	5MU	C4-C5	22.49	1.82	1.44
59	1	404	5MU	C4-C5	22.39	1.82	1.44
59	1	1577	5MU	C6-N1	15.73	1.64	1.38
59	1	404	5MU	C6-N1	15.62	1.64	1.38
59	1	1669	6MZ	O4'-C1'	13.39	1.59	1.41

The worst 5 of 70 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
21	2	1457	MA6	N1-C6-N6	-13.58	102.77	117.06
21	2	1458	MA6	N1-C6-N6	-13.50	102.85	117.06
59	1	1577	5MU	C5-C4-N3	10.78	124.51	115.31
59	1	404	5MU	C5-C4-N3	9.62	123.53	115.31
59	1	1669	6MZ	C1'-N9-C4	8.88	142.25	126.64

There are no chirality outliers.

5 of 15 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
59	1	1669	6MZ	C3'-C4'-C5'-O5'
59	1	1891	OMG	C1'-C2'-O2'-CM2
59	1	1669	6MZ	O4'-C4'-C5'-O5'
21	2	480	G7M	C3'-C4'-C5'-O5'
59	1	1891	OMG	O4'-C4'-C5'-O5'

There are no ring outliers.

8 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
21	2	1458	MA6	1	0
59	1	1577	5MU	1	0
59	1	1669	6MZ	1	0
21	2	912	2MG	2	0
21	2	1341	4OC	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
59	1	404	5MU	2	0
21	2	1455	2MG	2	0
59	1	1891	OMG	1	0

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 460 ligands modelled in this entry, 460 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
59	1	12
21	2	2
24	e	1
60	4	1

The worst 5 of 16 chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	e	187:GLY	C	227:ALA	N	25.55
1	1	1190:A	O3'	1196:U	P	16.56

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Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	4	259:U	O3'	266:A	P	16.51
1	1	1506:C	O3'	1509:G	P	16.30
1	1	1738:G	O3'	1830:G	P	15.17

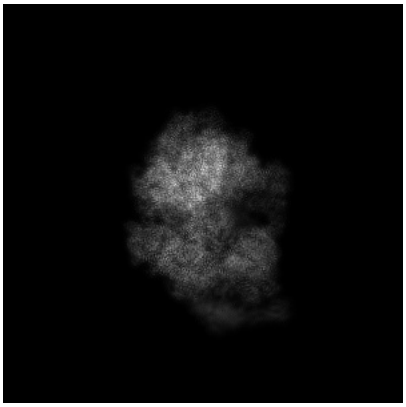
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-56602. These allow visual inspection of the internal detail of the map and identification of artifacts.

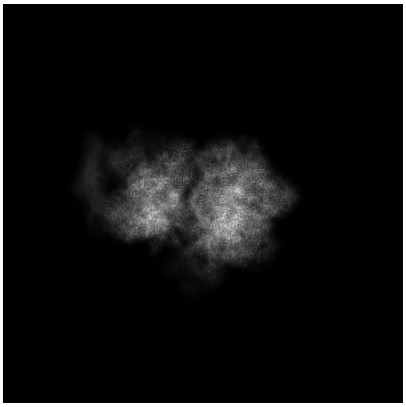
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections

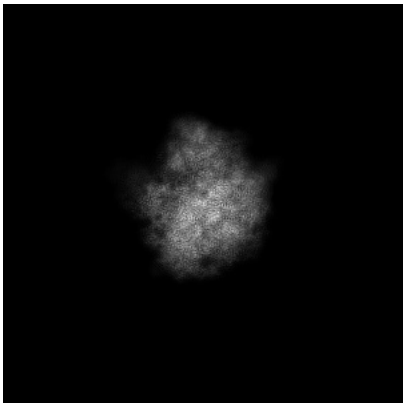
6.1.1 Primary map



X



Y



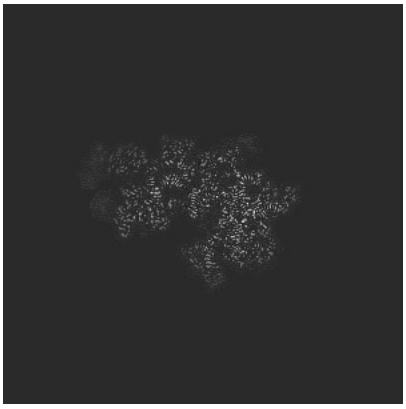
Z

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

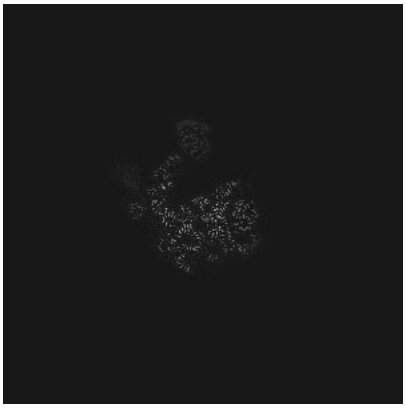
6.2 Central slices

6.2.1 Primary map

X Index: 256



Y Index: 256

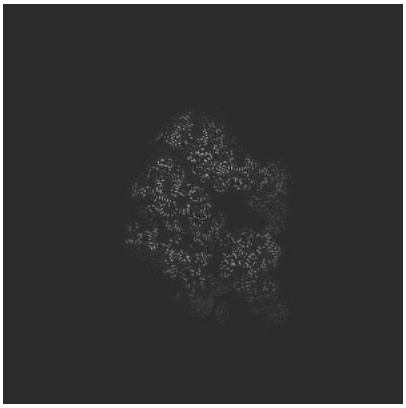


Z Index: 256

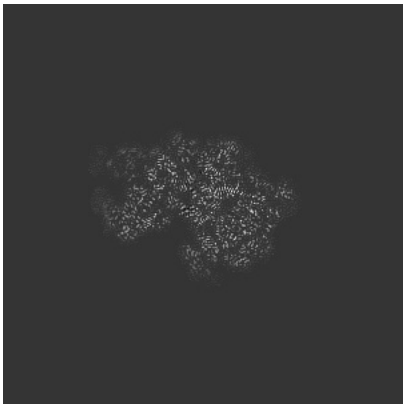
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

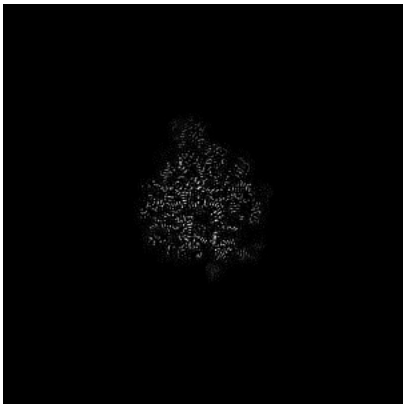
6.3.1 Primary map



X Index: 251



Y Index: 244

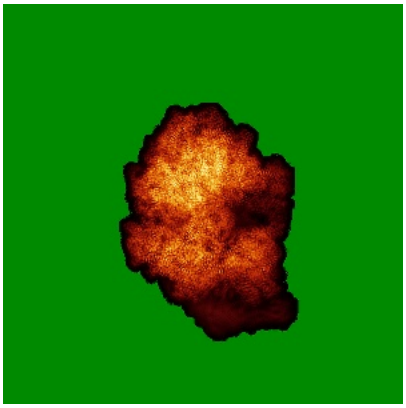


Z Index: 299

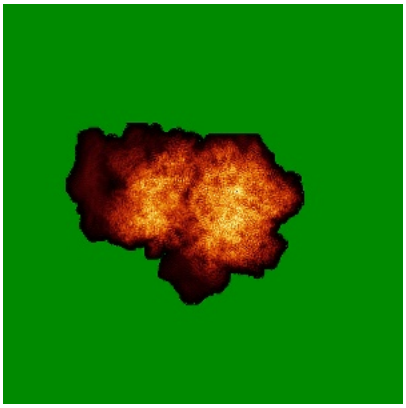
The images above show the largest variance slices of the map in three orthogonal directions.

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

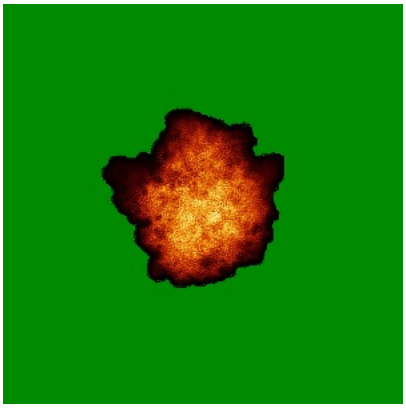
6.4.1 Primary map



X



Y

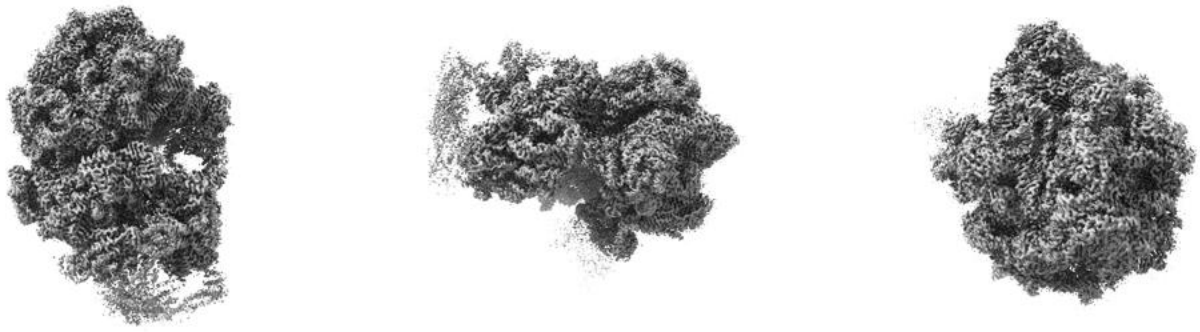


Z

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

6.5 Orthogonal surface views (i)

6.5.1 Primary map



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.107. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

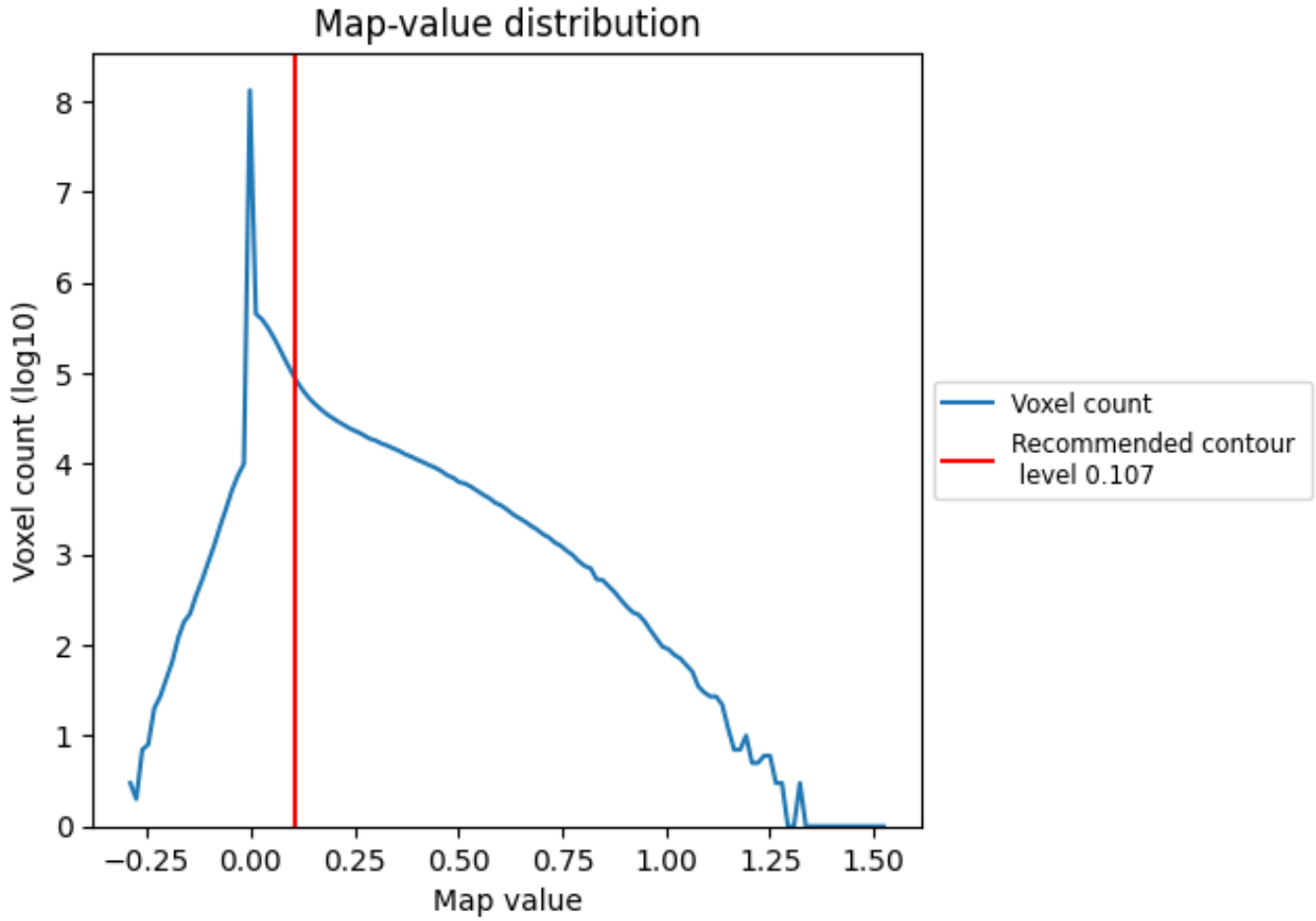
6.6 Mask visualisation (i)

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

7 Map analysis

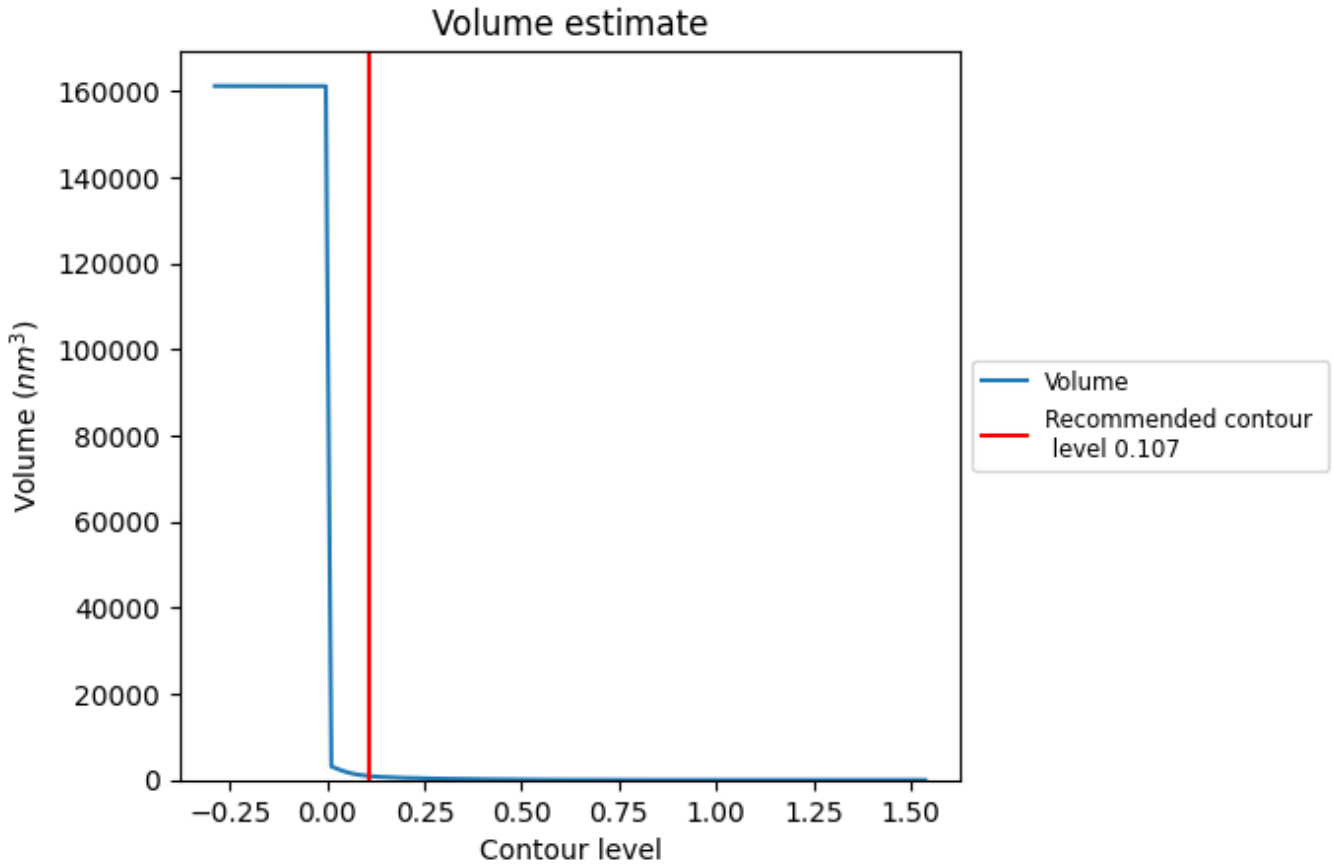
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



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

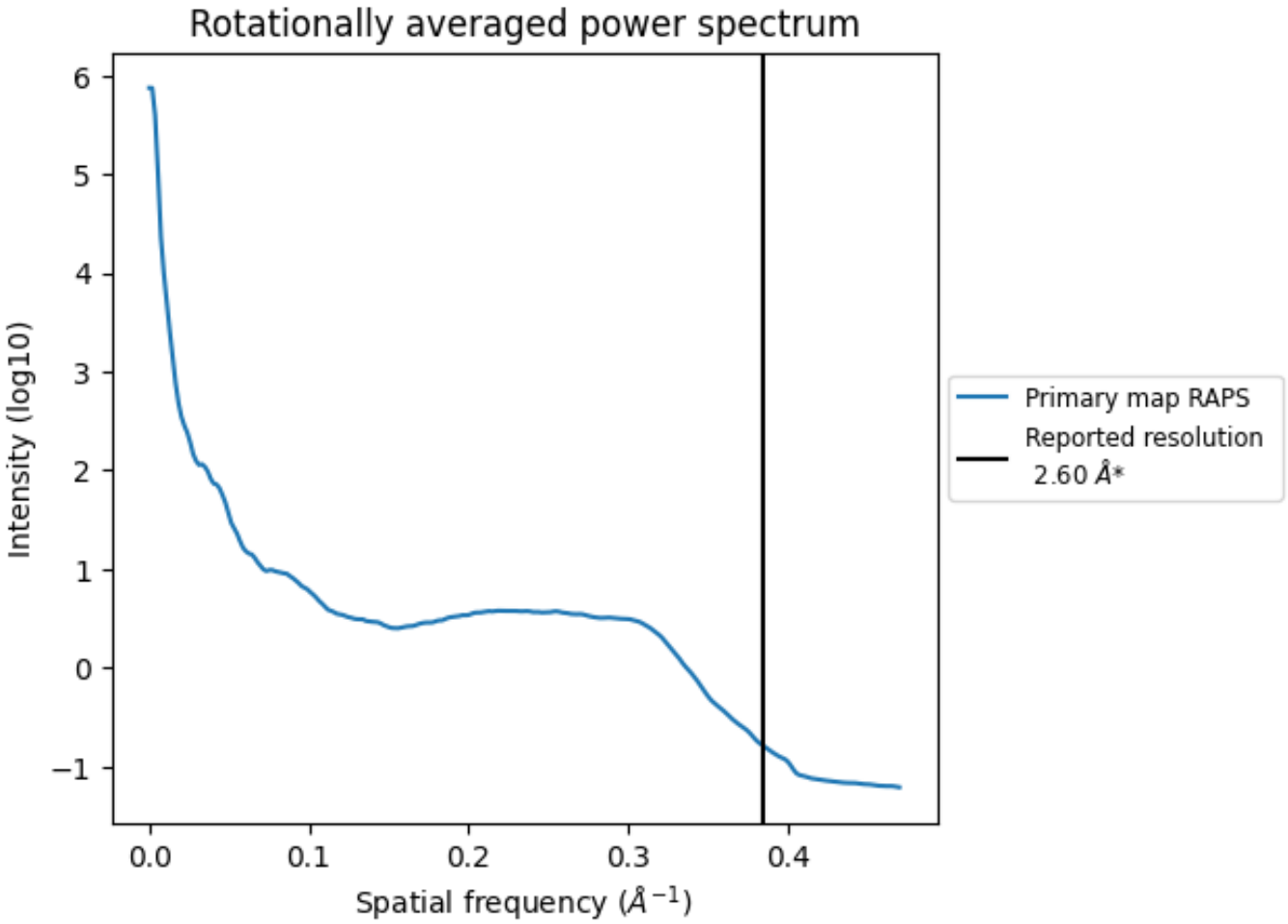
7.2 Volume estimate (i)



The volume at the recommended contour level is 915 nm^3; this corresponds to an approximate mass of 826 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}

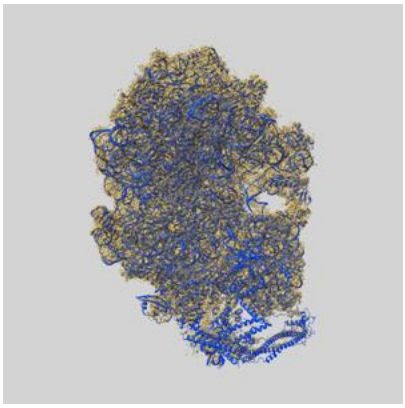
8 Fourier-Shell correlation

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

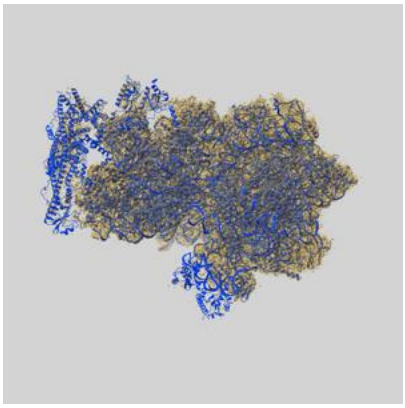
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-56602 and PDB model 28LU. Per-residue inclusion information can be found in section 3 on page 17.

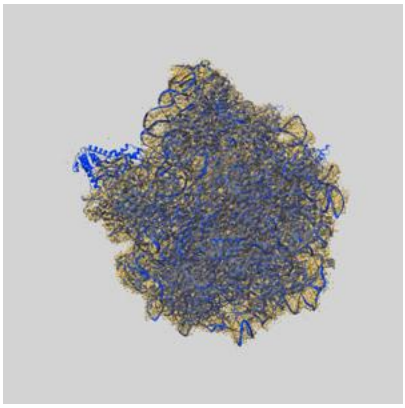
9.1 Map-model overlay



X



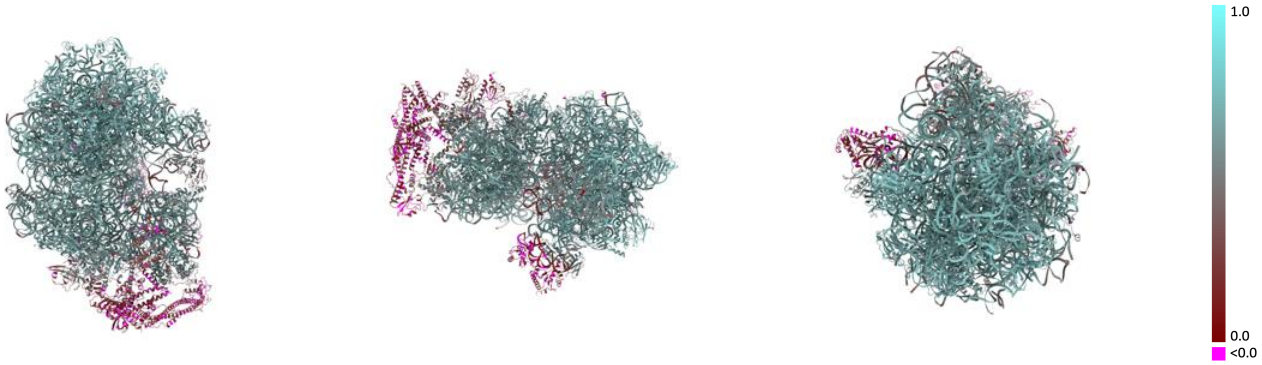
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.107 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.

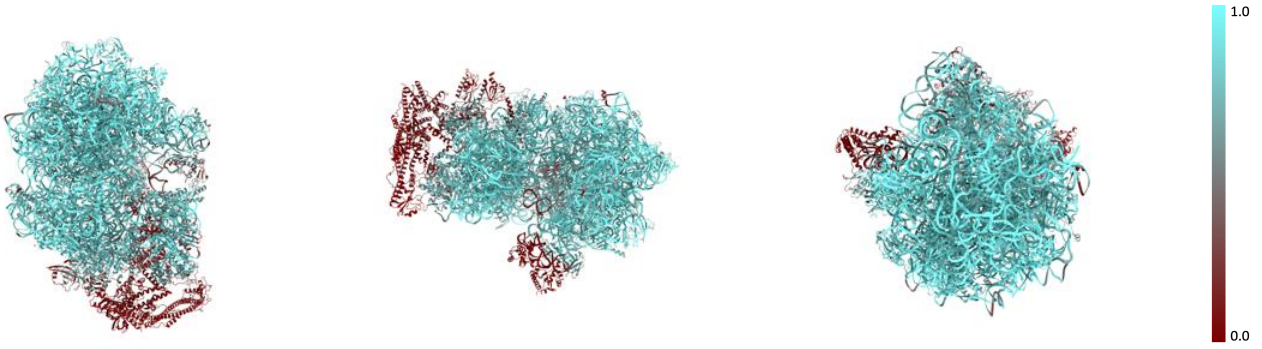
9.2 Q-score mapped to coordinate model



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.

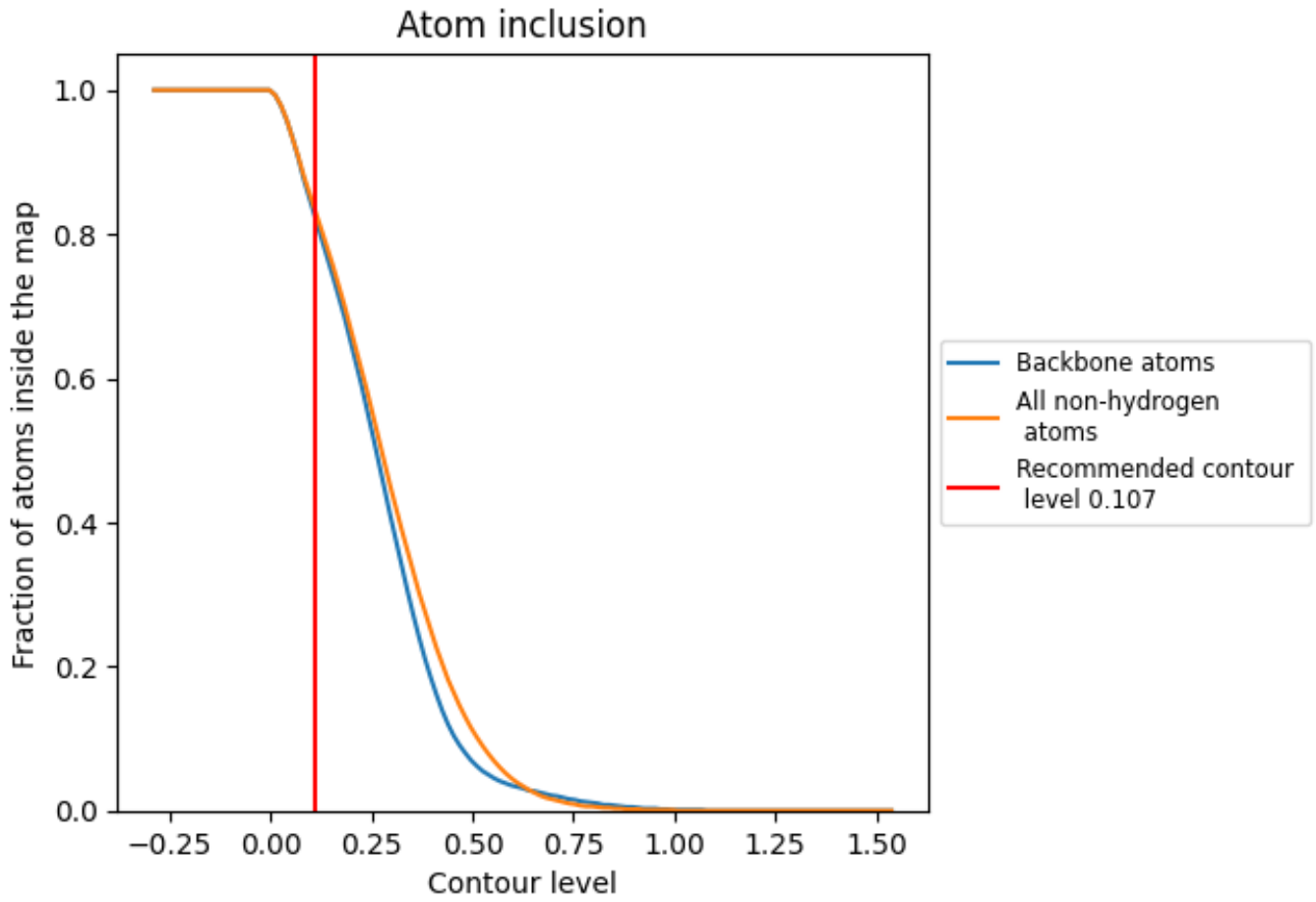
9.3 Atom inclusion mapped to coordinate model



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 (0.107).

9.4 Atom inclusion (i)



At the recommended contour level, 83% of all backbone atoms, 84% 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 (0.107) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8360	0.5830
0	0.9050	0.6620
1	0.9410	0.6390
2	0.9670	0.6200
3	0.8380	0.5420
4	0.9630	0.6490
5	0.9830	0.6630
6	0.9210	0.6630
7	0.9660	0.6860
8	0.9690	0.6800
9	0.9610	0.6730
B	0.9610	0.6880
C	0.9520	0.6800
D	0.9430	0.6770
E	0.4940	0.4600
F	0.7450	0.5770
G	0.7320	0.5630
H	0.0100	0.1190
I	0.0060	0.0740
J	0.9350	0.6700
K	0.9430	0.6770
L	0.8970	0.6530
M	0.9370	0.6750
N	0.9650	0.6800
O	0.7800	0.5850
P	0.8820	0.6400
Q	0.9860	0.6900
R	0.9380	0.6740
S	0.9260	0.6710
T	0.9540	0.6670
U	0.8860	0.6510
V	0.8510	0.6120
W	0.9110	0.6570
X	0.8910	0.6490
Y	0.3120	0.3680

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Chain	Atom inclusion	Q-score
Z	0.9370	0.6630
a	0.3650	0.3400
b	0.3670	0.3470
c	0.5000	0.3990
d	0.6720	0.4920
e	0.4100	0.3370
f	0.8350	0.6060
g	0.6950	0.5370
h	0.9100	0.6370
i	0.5910	0.4800
j	0.7850	0.5760
k	0.8600	0.6120
l	0.9330	0.6460
m	0.7700	0.5620
n	0.9330	0.6330
o	0.8630	0.6030
p	0.9350	0.6380
q	0.8740	0.6210
r	0.8940	0.6230
s	0.8650	0.6080
t	0.8260	0.5770
u	0.7740	0.5800
v	0.2530	0.3050
w	0.2890	0.2770
x	0.8960	0.6180
y	0.6690	0.5580