



## Full wwPDB EM Validation Report ⓘ

Dec 2, 2024 – 11:20 PM JST

PDB ID : 8YLD  
EMDB ID : EMD-38666  
Title : State 4a (S4a) of yeast 80S ribosome bound to 2 tRNAs and open eEF3 and eEF2 during translocation  
Authors : Cheng, J.; Wu, C.L.; Li, J.X.; Zhang, X.Z.  
Deposited on : 2024-03-06  
Resolution : 3.90 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto: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>.

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

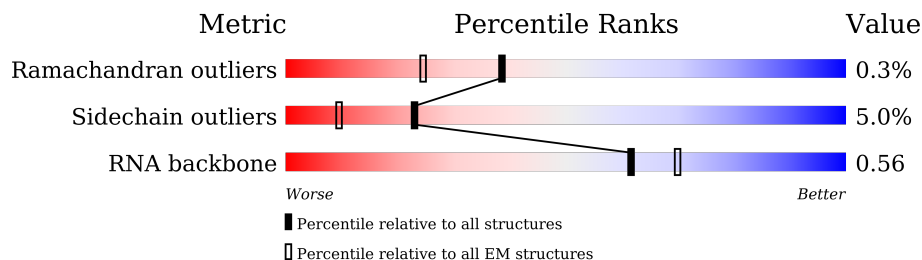
EMDB validation analysis : 0.0.1.dev113  
MolProbity : 4.02b-467  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.40

# 1 Overall quality at a glance i

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

The reported resolution of this entry is 3.90 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415
RNA backbone	6643	2191

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

Mol	Chain	Length	Quality of chain
1	S	185	
2	2	1799	
3	A	3394	
4	B	121	
5	C	158	
6	D	251	
7	E	386	
8	F	361	

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Mol	Chain	Length	Quality of chain
9	G	294	34% 93%
10	H	175	26% 91% 5%
11	I	223	17% 94% 5%
12	K	191	21% 95%
13	L	218	28% 96%
14	M	169	39% 93% 7%
15	N	193	23% 98%
16	O	136	21% 96%
17	P	203	27% 94% 6%
18	Q	197	22% 94% 6%
19	R	183	20% 97%
20	T	188	21% 95%
21	U	171	23% 94% 6%
22	V	159	23% 97%
23	W	100	33% 94% 6%
24	X	136	40% 93%
25	Y	126	40% 83% 6% 10%
26	Z	121	19% 98%
27	a	125	21% 94% 6%
28	b	135	20% 96%
29	c	148	20% 97%
30	d	58	36% 98%
31	e	96	23% 95% 5%
32	f	109	28% 96%
33	g	127	24% 94% 6%

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Mol	Chain	Length	Quality of chain
34	h	106	21% 95% 5%
35	i	112	31% 92% 8%
36	j	119	14% 98% .
37	k	99	20% 97% .
38	l	81	21% 89% 11%
39	m	77	27% 99% .
40	n	50	26% 98% .
41	o	52	31% 98% .
42	p	25	52% 100%
43	q	103	32% 91% 9%
44	r	91	32% 96% .
45	s	75	40% 81% 19%
45	t	75	5% 59% 41%
46	v	977	83% 98% .
47	x	842	86% 95% 5% .
48	SC	92	66% 97% .
49	SE	117	62% 91% 6% .
50	SA	222	62% 95% .
51	SI	143	50% 97% .
52	SL	63	78% 94% 6%
53	SM	53	32% 83% 6% 11%
54	SG	121	50% 91% 9%
55	SB	206	68% 97% .
56	SF	141	65% 92% 8%
57	SH	145	66% 94% 6%

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Mol	Chain	Length	Quality of chain
58	SK	108	57% 67% 5% 29%
59	SN	73	75% 100%
60	SD	121	89% 95% ..
61	SZ	127	35% 94% 6%
62	Se	94	48% 91% 9%
63	SP	206	45% 96% .
64	SQ	232	40% 86% 6% 8%
65	SR	216	44% 97% .
66	SS	258	54% 94% 6%
67	ST	228	54% 92% 7% .
68	SU	184	47% 96% .
69	SV	200	50% 88% 5% 6%
70	SW	184	49% 95% 5%
71	SX	142	46% 96% ..
72	SY	150	40% 93% 7%
73	Sa	87	43% 97% .
74	Sb	129	37% 91% 9%
75	Sc	144	61% 95% 5%
76	Sd	134	49% 96% .
77	Sf	81	41% 91% 9%
78	Sg	60	53% 87% 5% 8%
79	SJ	100	61% 98% .
80	J	233	21% 97% ..
81	SO	318	81% 90% 9%

## 2 Entry composition [i](#)

There are 81 unique types of molecules in this entry. The entry contains 216269 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 Large ribosomal subunit protein eL18A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	S	185	1441	908	290	241	2	0	0

- Molecule 2 is a RNA chain called 18S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	2	1771	37739	16872	6683	12413	1771	0	0

- Molecule 3 is a RNA chain called 25S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
3	A	3193	68298	30507	12315	22283	3193	0	0

- Molecule 4 is a RNA chain called 5S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
4	B	121	2579	1152	461	845	121	0	0

- Molecule 5 is a RNA chain called 5.8S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
5	C	158	3353	1500	586	1109	158	0	0

- Molecule 6 is a protein called Large ribosomal subunit protein uL2A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	D	245	1863	1162	376	324	1	0	0

- Molecule 7 is a protein called Large ribosomal subunit protein uL3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	E	386	3075	1950	584	533	8	0	0

- Molecule 8 is a protein called Large ribosomal subunit protein uL4A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	F	361	2748	1729	522	494	3	0	0

- Molecule 9 is a protein called Large ribosomal subunit protein uL18.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	G	288	2311	1462	402	445	2	0	0

- Molecule 10 is a protein called Large ribosomal subunit protein eL6B.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
10	H	167	1307	843	234	230	0	0

- Molecule 11 is a protein called Large ribosomal subunit protein uL30A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	I	222	1784	1151	324	308	1	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
I	22	ILE	THR	conflict	UNP P05737

- Molecule 12 is a protein called Large ribosomal subunit protein uL6A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	K	188	1493	948	271	270	4	0	0

- Molecule 13 is a protein called Large ribosomal subunit protein uL16.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	L	218	1764	1117	334	306	7	0	0

- Molecule 14 is a protein called Large ribosomal subunit protein uL5B.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
14	M	169	1346	843	252	247	4	0	0

- Molecule 15 is a protein called Large ribosomal subunit protein eL13A.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
15	N	193	1543	962	315	266	0	0

- Molecule 16 is a protein called Large ribosomal subunit protein eL14A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
16	O	136	1053	675	199	177	2	0	0

- Molecule 17 is a protein called Large ribosomal subunit protein eL15A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
17	P	203	1720	1077	361	281	1	0	0

- Molecule 18 is a protein called Large ribosomal subunit protein uL13A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
18	Q	197	1555	1003	289	262	1	197	0

- Molecule 19 is a protein called Large ribosomal subunit protein uL22A.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
19	R	183	1416	879	284	253	0	0

- Molecule 20 is a protein called Large ribosomal subunit protein eL19A.



Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
20	T	184	1484	914	318	252	0	0

- Molecule 21 is a protein called Large ribosomal subunit protein eL20A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
21	U	171	1437	925	266	243	3	0	0

- Molecule 22 is a protein called Large ribosomal subunit protein eL21A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
22	V	157	1253	787	243	219	4	0	0

- Molecule 23 is a protein called Large ribosomal subunit protein eL22A.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
23	W	100	796	516	131	149	0	0

- Molecule 24 is a protein called Large ribosomal subunit protein uL14A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
24	X	132	981	617	184	173	7	0	0

- Molecule 25 is a protein called Large ribosomal subunit protein eL24A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
25	Y	113	771	486	152	132	1	0	0

- Molecule 26 is a protein called Large ribosomal subunit protein uL23.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
26	Z	119	954	614	167	171	2	0	0

- Molecule 27 is a protein called Large ribosomal subunit protein uL24A.

Mol	Chain	Residues	Atoms				AltConf	Trace
27	a	125	Total	C	N	O	0	0
			984	620	191	173		

- Molecule 28 is a protein called Large ribosomal subunit protein eL27A.

Mol	Chain	Residues	Atoms				AltConf	Trace
28	b	135	Total	C	N	O	0	0
			1080	701	199	180		

- Molecule 29 is a protein called Large ribosomal subunit protein uL15.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	c	148	Total	C	N	O	S	0	0
			1169	747	231	188	3		

- Molecule 30 is a protein called Large ribosomal subunit protein eL29.

Mol	Chain	Residues	Atoms				AltConf	Trace
30	d	58	Total	C	N	O	0	0
			462	289	100	73		

- Molecule 31 is a protein called Large ribosomal subunit protein eL30.

Mol	Chain	Residues	Atoms					AltConf	Trace
31	e	96	Total	C	N	O	S	0	0
			737	476	123	137	1		

- Molecule 32 is a protein called Large ribosomal subunit protein eL31A.

Mol	Chain	Residues	Atoms					AltConf	Trace
32	f	109	Total	C	N	O	S	0	0
			876	556	167	152	1		

- Molecule 33 is a protein called Large ribosomal subunit protein eL32.

Mol	Chain	Residues	Atoms					AltConf	Trace
33	g	127	Total	C	N	O	S	0	0
			1013	642	205	165	1		

- Molecule 34 is a protein called Large ribosomal subunit protein eL33A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
34	h	106	850	540	165	144	1	0	0

- Molecule 35 is a protein called Large ribosomal subunit protein eL34A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
35	i	112	880	545	179	152	4	0	0

- Molecule 36 is a protein called Large ribosomal subunit protein uL29A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
36	j	119	969	615	186	167	1	0	0

- Molecule 37 is a protein called Large ribosomal subunit protein eL36A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
37	k	99	766	478	154	132	2	0	0

- Molecule 38 is a protein called Large ribosomal subunit protein eL37A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
38	l	81	645	393	141	106	5	0	0

- Molecule 39 is a protein called Large ribosomal subunit protein eL38.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
39	m	77	612	391	115	106	0	0

- Molecule 40 is a protein called Large ribosomal subunit protein eL39.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
40	n	50	436	272	97	65	2	0	0

- Molecule 41 is a protein called Large ribosomal subunit protein eL40A.

Mol	Chain	Residues	Atoms					AltConf	Trace
41	o	52	Total	C	N	O	S	0	0
			410	254	86	65	5		

- Molecule 42 is a protein called Large ribosomal subunit protein eL41A.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	p	25	Total	C	N	O	S	0	0
			229	139	62	27	1		

- Molecule 43 is a protein called Large ribosomal subunit protein eL42A.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	q	103	Total	C	N	O	S	0	0
			824	517	167	135	5		

- Molecule 44 is a protein called Large ribosomal subunit protein eL43A.

Mol	Chain	Residues	Atoms					AltConf	Trace
44	r	91	Total	C	N	O	S	0	0
			694	429	138	121	6		

- Molecule 45 is a RNA chain called tRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	s	75	Total	C	N	O	P	0	0
			1605	716	297	517	75		
45	t	75	Total	C	N	O	P	0	0
			1606	716	297	518	75		

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
s	10	A	G	conflict	GB 176433
t	10	A	G	conflict	GB 176433

- Molecule 46 is a protein called Elongation factor 3A.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	v	977	Total	C	N	O	S	0	0
			7476	4726	1295	1418	37		

- Molecule 47 is a protein called Elongation factor 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
47	x	837	6520	4140	1118	1233	29	0	0

- Molecule 48 is a protein called Small ribosomal subunit protein eS10A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
48	SC	92	752	487	122	141	2	0	0

- Molecule 49 is a protein called Small ribosomal subunit protein uS19.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
49	SE	114	894	570	166	151	7	0	0

- Molecule 50 is a protein called Small ribosomal subunit protein uS3.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
50	SA	217	1687	1071	306	304	6	0	0

- Molecule 51 is a protein called Small ribosomal subunit protein eS19A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
51	SI	143	1112	694	208	208	2	0	0

- Molecule 52 is a protein called Small ribosomal subunit protein eS28A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
52	SL	63	491	303	96	91	1	0	0

- Molecule 53 is a protein called Small ribosomal subunit protein uS14A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
53	SM	47	387	237	84	62	4	0	0

- Molecule 54 is a protein called Small ribosomal subunit protein eS17A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
54	SG	121	961	599	182	178	2	0	0

- Molecule 55 is a protein called Small ribosomal subunit protein uS7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
55	SB	206	1605	1005	299	298	3	0	0

- Molecule 56 is a protein called Small ribosomal subunit protein uS9A.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
56	SF	141	1105	708	203	194	0	0

- Molecule 57 is a protein called Small ribosomal subunit protein uS13A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
57	SH	145	1188	741	237	208	2	0	0

- Molecule 58 is a protein called Small ribosomal subunit protein eS25A.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
58	SK	77	608	387	115	106	0	0

- Molecule 59 is a protein called Small ribosomal subunit protein eS31.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
59	SN	73	560	355	106	95	4	0	0

- Molecule 60 is a protein called Small ribosomal subunit protein eS12.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
60	SD	121	875	551	153	169	2	0	0

- Molecule 61 is a protein called Small ribosomal subunit protein uS11B.

Mol	Chain	Residues	Atoms					AltConf	Trace
61	SZ	127	Total	C	N	O	S	0	0
			891	545	182	163	1		

- Molecule 62 is a protein called Small ribosomal subunit protein eS26A.

Mol	Chain	Residues	Atoms					AltConf	Trace
62	Se	94	Total	C	N	O	S	0	0
			750	462	157	126	5		

- Molecule 63 is a protein called Small ribosomal subunit protein uS2A.

Mol	Chain	Residues	Atoms					AltConf	Trace
63	SP	206	Total	C	N	O	S	0	0
			1603	1030	284	287	2		

- Molecule 64 is a protein called Small ribosomal subunit protein eS1A.

Mol	Chain	Residues	Atoms					AltConf	Trace
64	SQ	214	Total	C	N	O	S	0	0
			1709	1084	310	311	4		

- Molecule 65 is a protein called Small ribosomal subunit protein uS5.

Mol	Chain	Residues	Atoms					AltConf	Trace
65	SR	216	Total	C	N	O	S	0	0
			1626	1042	287	295	2		

- Molecule 66 is a protein called Small ribosomal subunit protein eS4A.

Mol	Chain	Residues	Atoms					AltConf	Trace
66	SS	258	Total	C	N	O	S	0	0
			2056	1308	387	358	3		

- Molecule 67 is a protein called Small ribosomal subunit protein eS6A.

Mol	Chain	Residues	Atoms					AltConf	Trace
67	ST	224	Total	C	N	O	S	0	0
			1789	1123	344	319	3		

- Molecule 68 is a protein called Small ribosomal subunit protein eS7A.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
68	SU	184	1473	946	263	264	0	0

- Molecule 69 is a protein called Small ribosomal subunit protein eS8A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
69	SV	187	1476	916	295	263	2	0	0

- Molecule 70 is a protein called Small ribosomal subunit protein uS4A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
70	SW	184	1479	935	285	258	1	0	0

- Molecule 71 is a protein called Small ribosomal subunit protein uS17A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
71	SX	140	1132	727	215	187	3	0	0

- Molecule 72 is a protein called Small ribosomal subunit protein uS15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
72	SY	150	1192	759	224	207	2	0	0

- Molecule 73 is a protein called Small ribosomal subunit protein eS21A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
73	Sa	87	673	415	125	131	2	0	0

- Molecule 74 is a protein called Small ribosomal subunit protein uS8A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
74	Sb	129	1021	650	188	180	3	0	0

- Molecule 75 is a protein called Small ribosomal subunit protein uS12A.



Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
75	Sc	144	1121	708	220	191	2	0	0

- Molecule 76 is a protein called Small ribosomal subunit protein eS24A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
76	Sd	134	1073	676	208	189		0	0

- Molecule 77 is a protein called Small ribosomal subunit protein eS27A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
77	Sf	81	610	382	110	113	5	0	0

- Molecule 78 is a protein called Small ribosomal subunit protein eS30A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
78	Sg	55	437	276	89	71	1	0	0

- Molecule 79 is a protein called Small ribosomal subunit protein uS10.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
79	SJ	100	797	506	144	146	1	0	0

- Molecule 80 is a protein called Large ribosomal subunit protein eL8A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
80	J	231	1793	1145	321	324	3	0	0

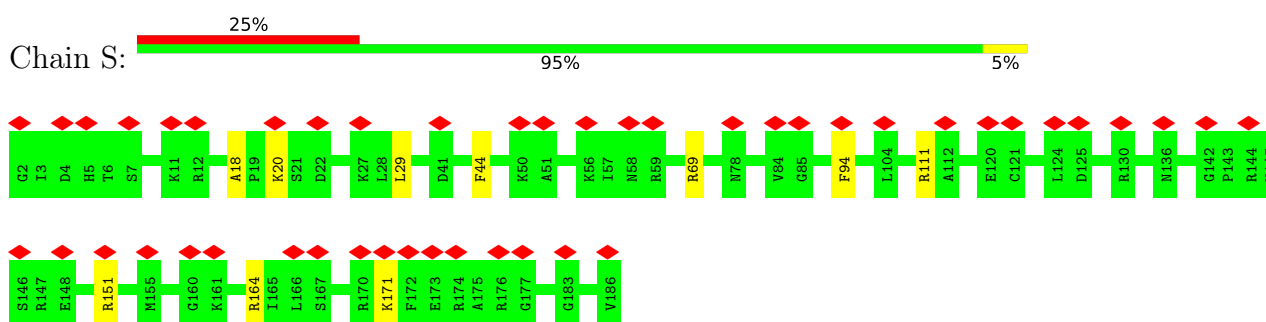
- Molecule 81 is a protein called Small ribosomal subunit protein RACK1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
81	SO	318	2436	1541	418	469	8	0	0

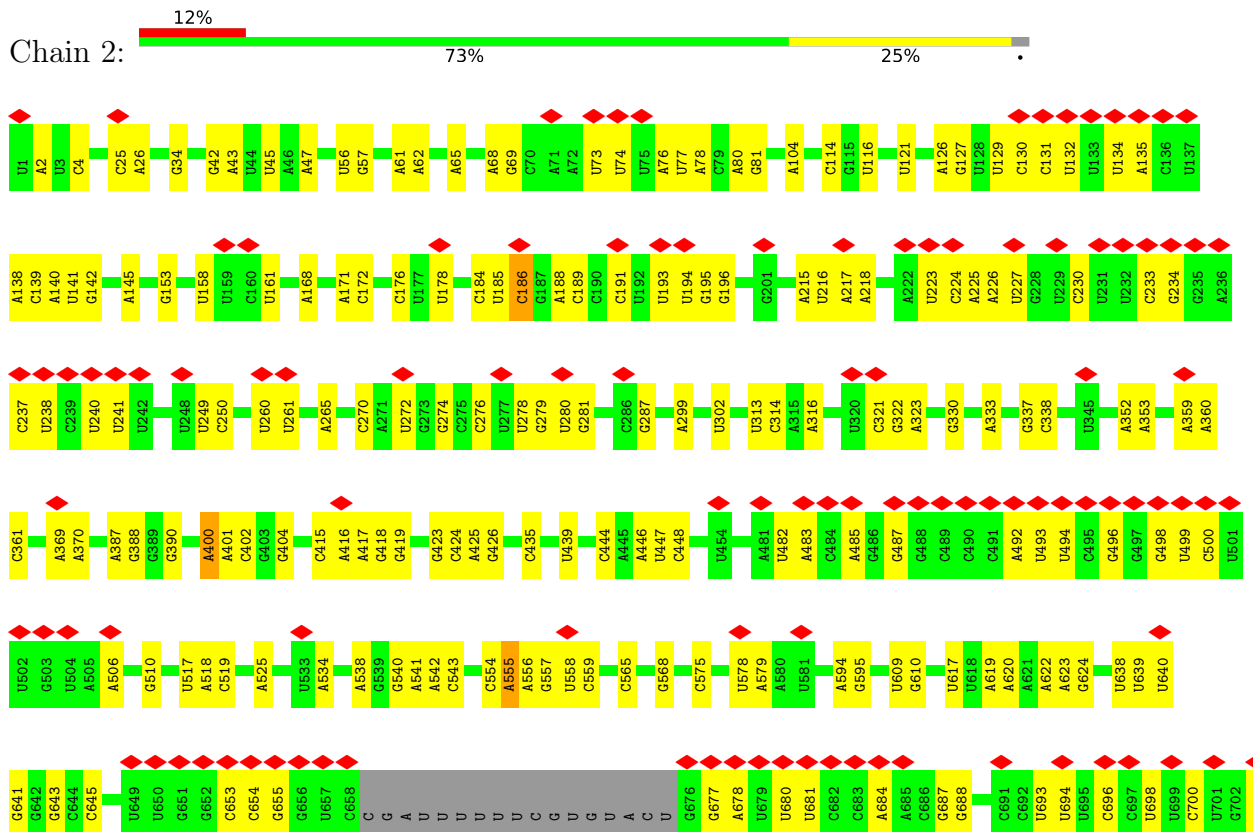
### 3 Residue-property plots

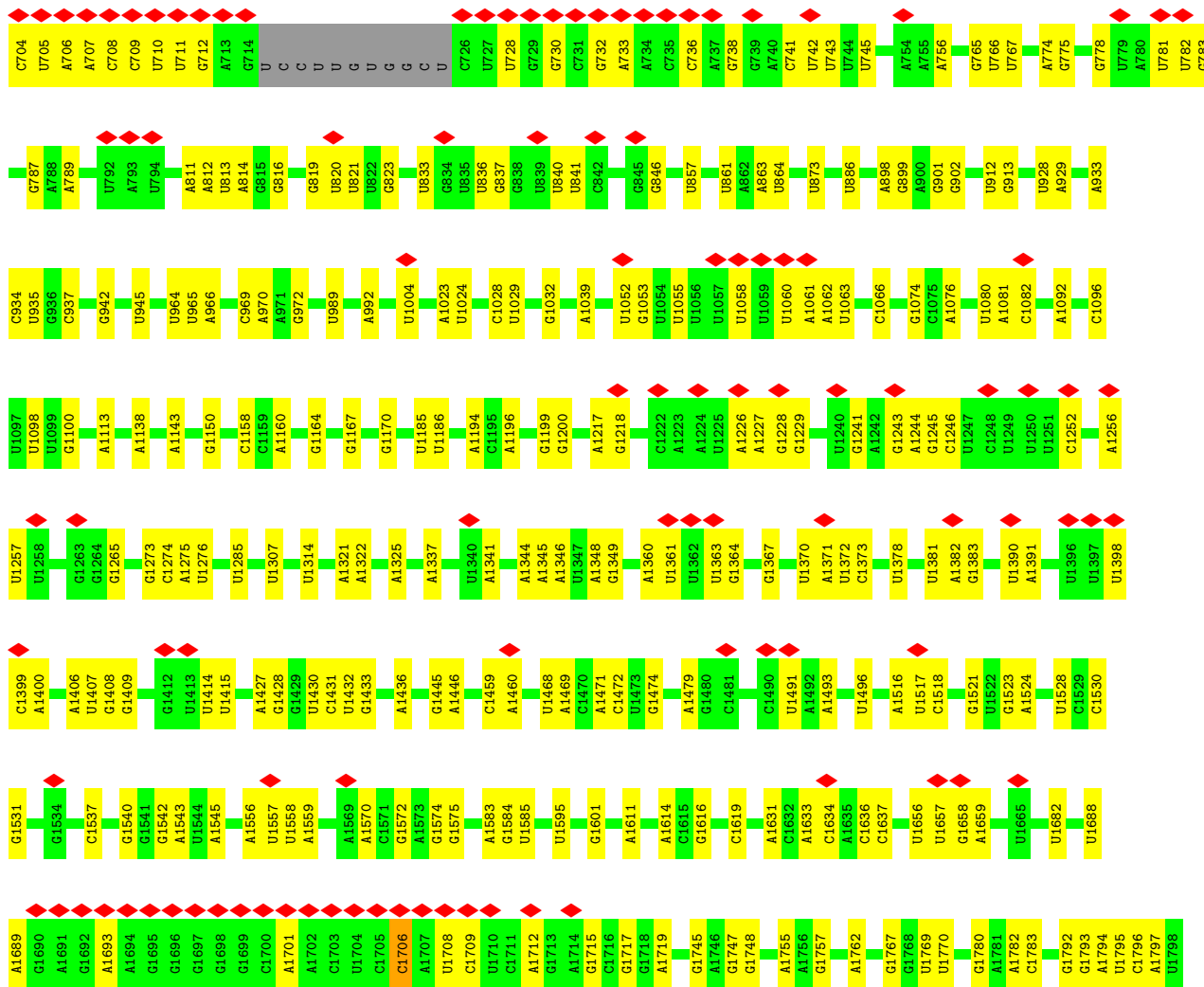
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: Large ribosomal subunit protein eL18A

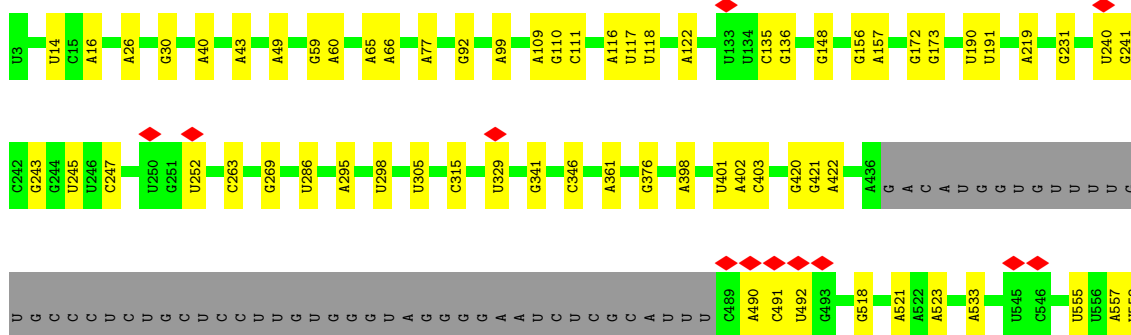
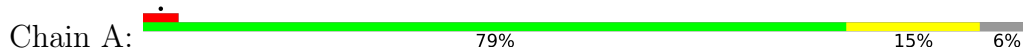


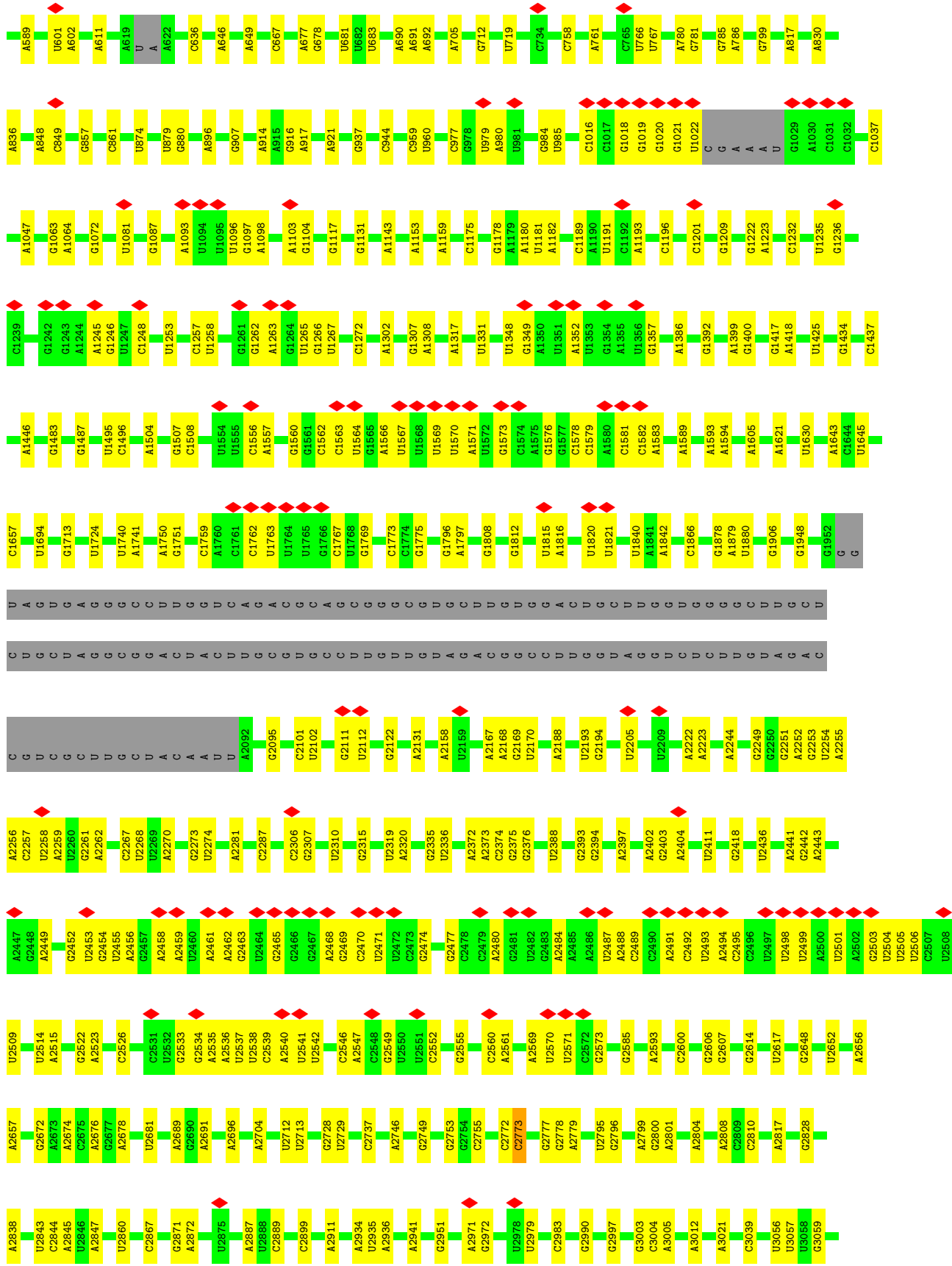
- Molecule 2: 18S rRNA

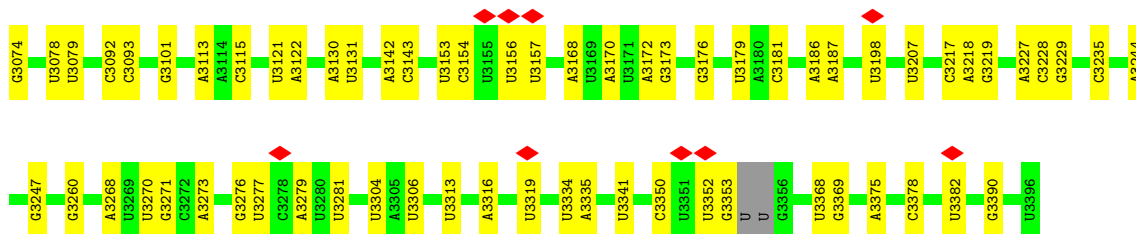




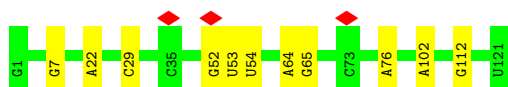
• Molecule 3: 25S rRNA



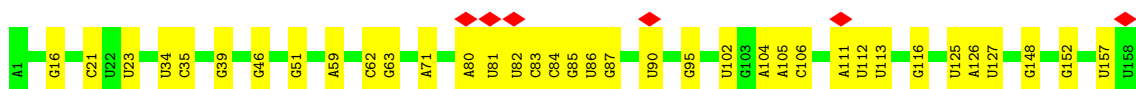
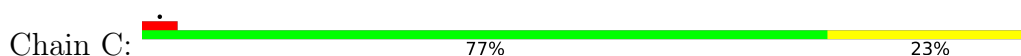




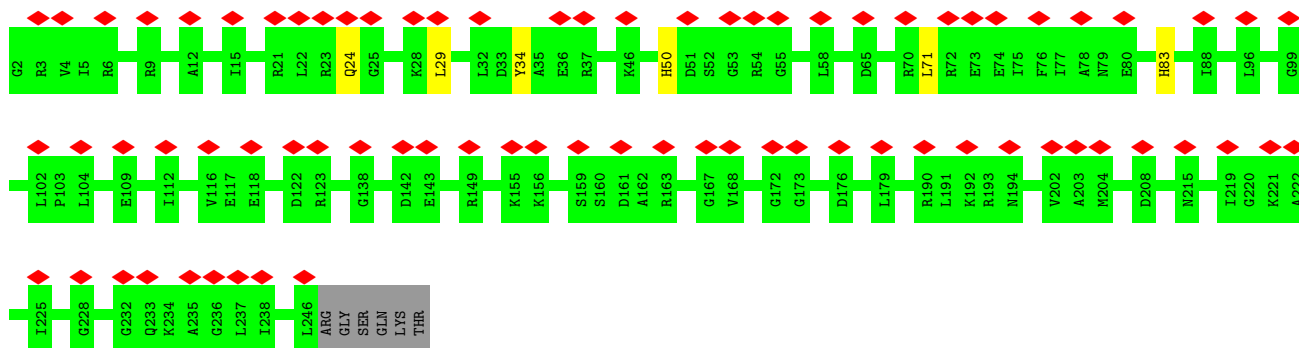
• Molecule 4: 5S rRNA



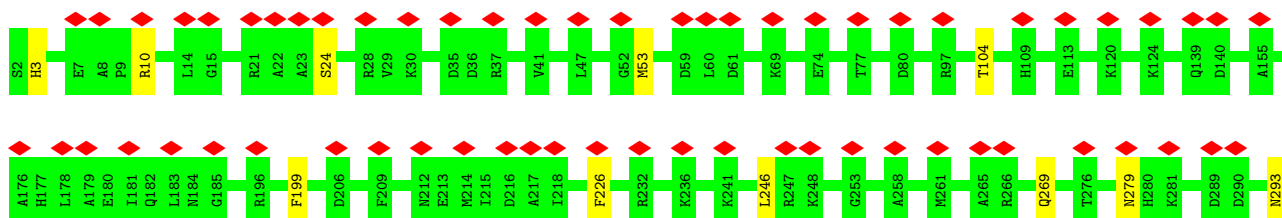
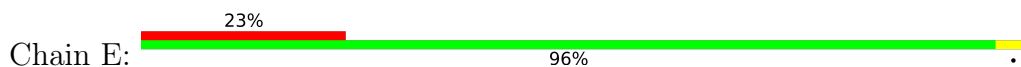
• Molecule 5: 5.8S rRNA

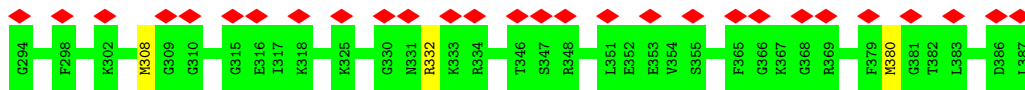


• Molecule 6: Large ribosomal subunit protein uL2A

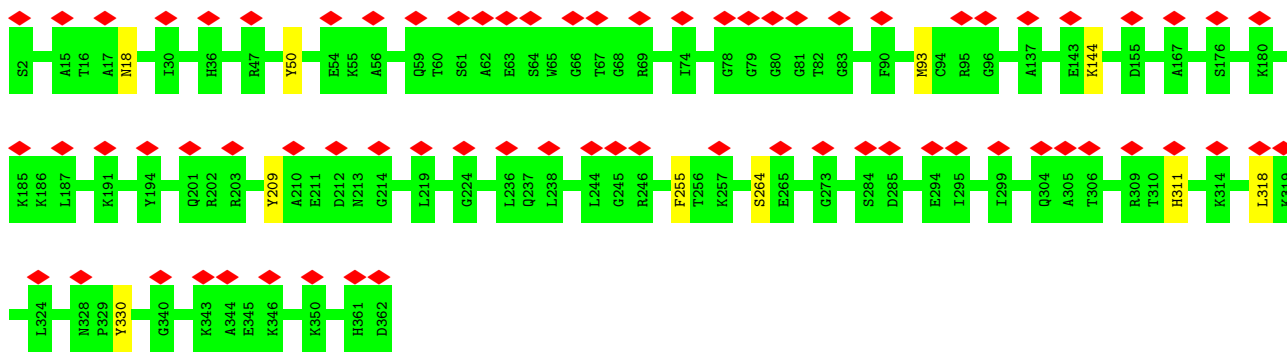


• Molecule 7: Large ribosomal subunit protein uL3

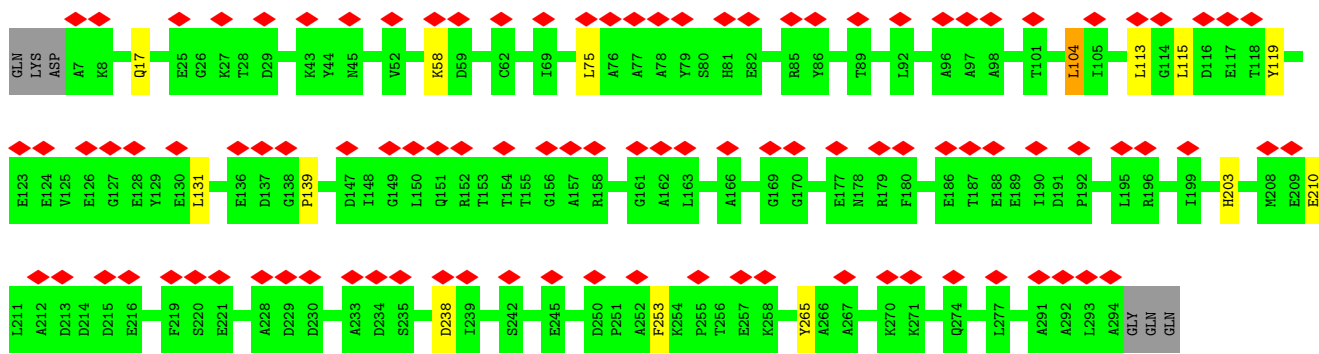
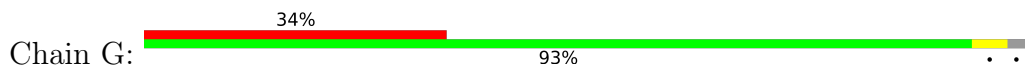




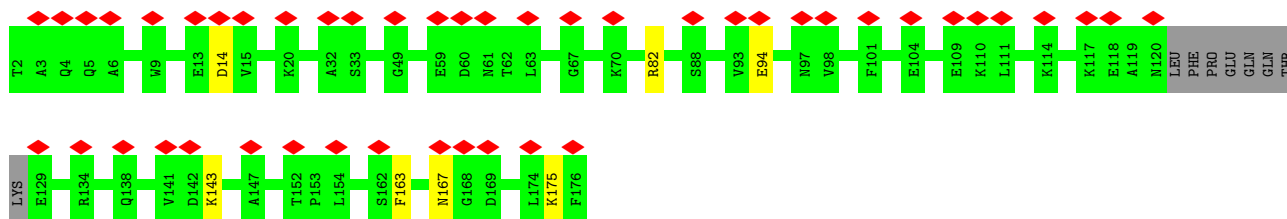
- Molecule 8: Large ribosomal subunit protein uL4A



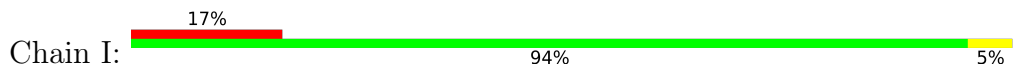
- Molecule 9: Large ribosomal subunit protein uL18

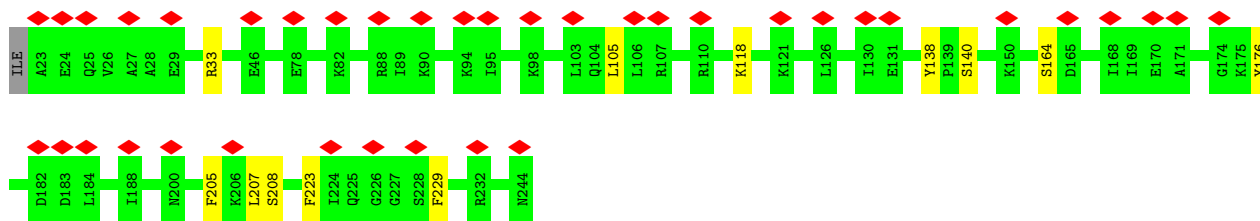


- Molecule 10: Large ribosomal subunit protein eL6B

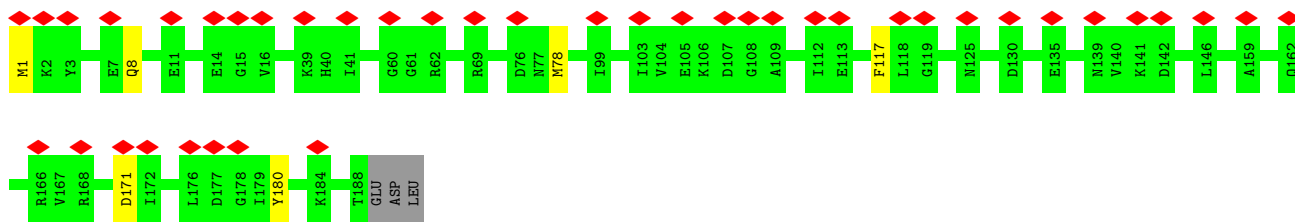


- Molecule 11: Large ribosomal subunit protein uL30A

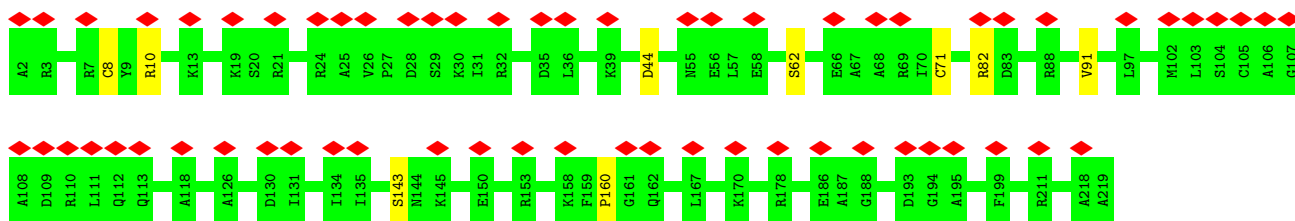




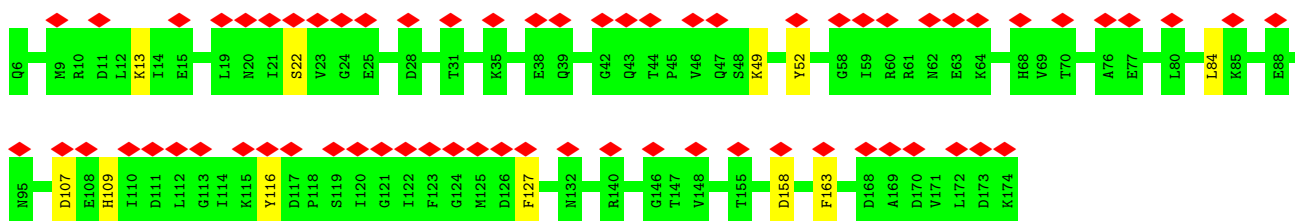
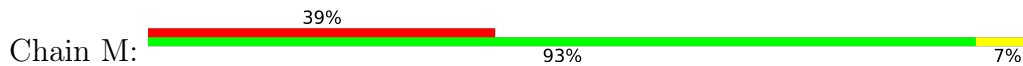
- Molecule 12: Large ribosomal subunit protein uL6A



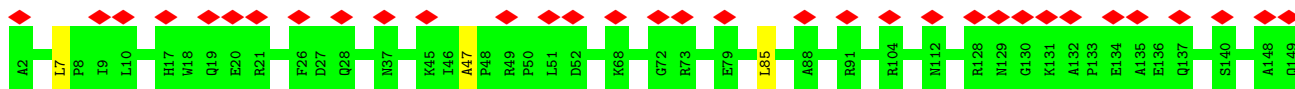
- Molecule 13: Large ribosomal subunit protein uL16

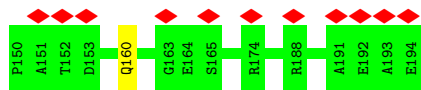


- Molecule 14: Large ribosomal subunit protein uL5B

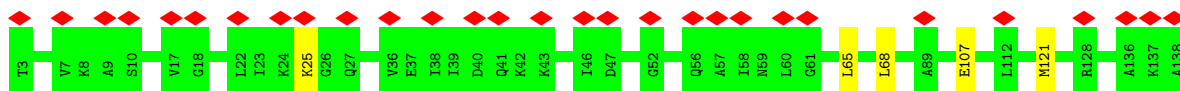


- Molecule 15: Large ribosomal subunit protein eL13A

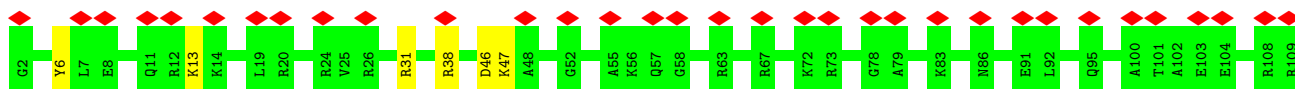
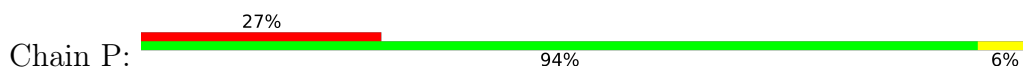




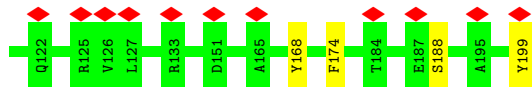
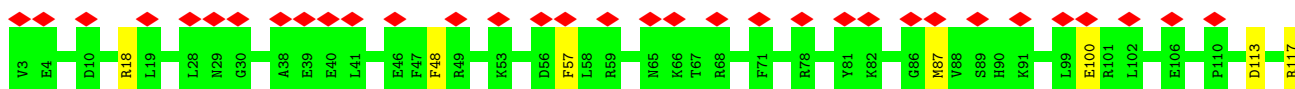
- Molecule 16: Large ribosomal subunit protein eL14A



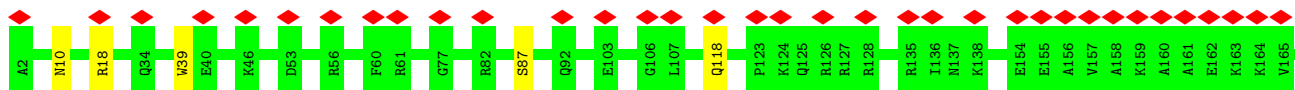
- Molecule 17: Large ribosomal subunit protein eL15A



- Molecule 18: Large ribosomal subunit protein uL13A



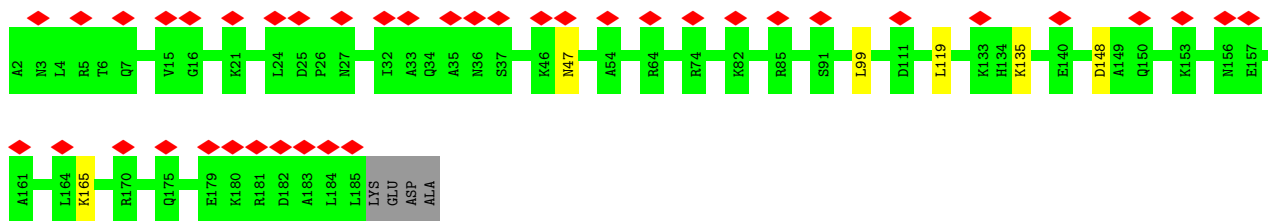
- Molecule 19: Large ribosomal subunit protein uL22A



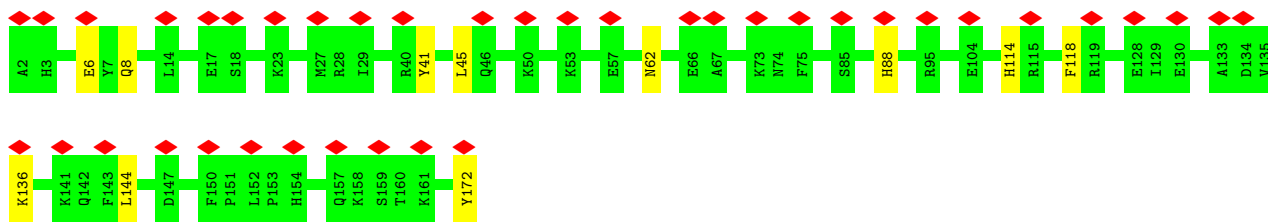
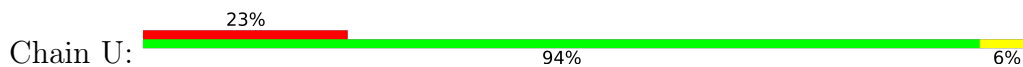
- Molecule 20: Large ribosomal subunit protein eL19A



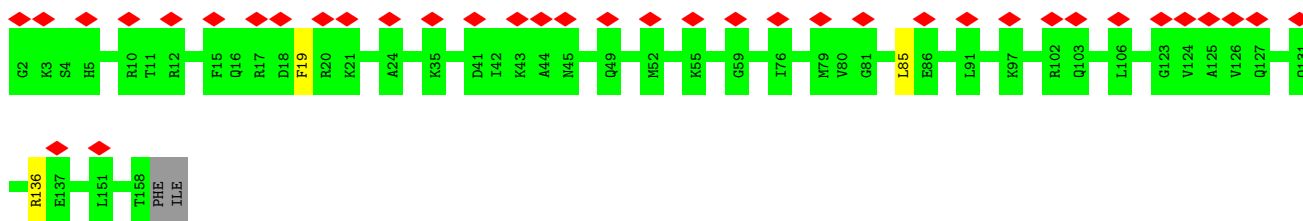




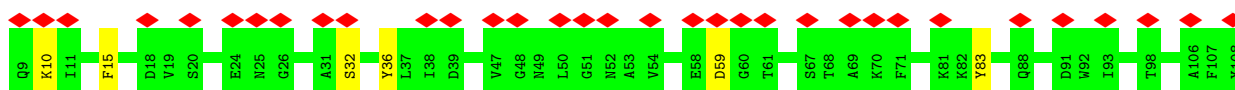
- Molecule 21: Large ribosomal subunit protein eL20A



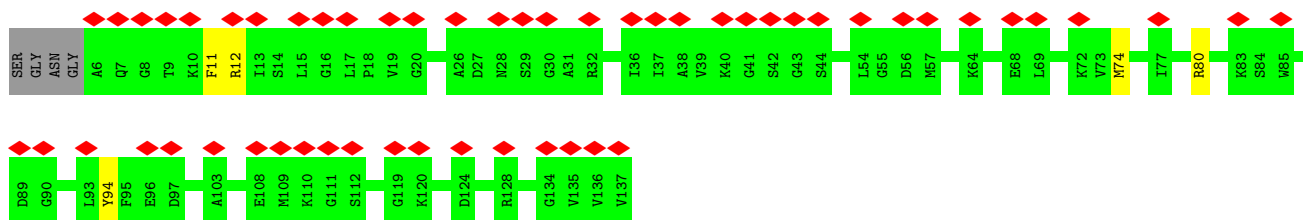
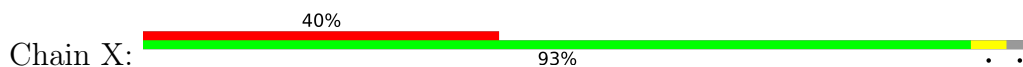
- Molecule 22: Large ribosomal subunit protein eL21A



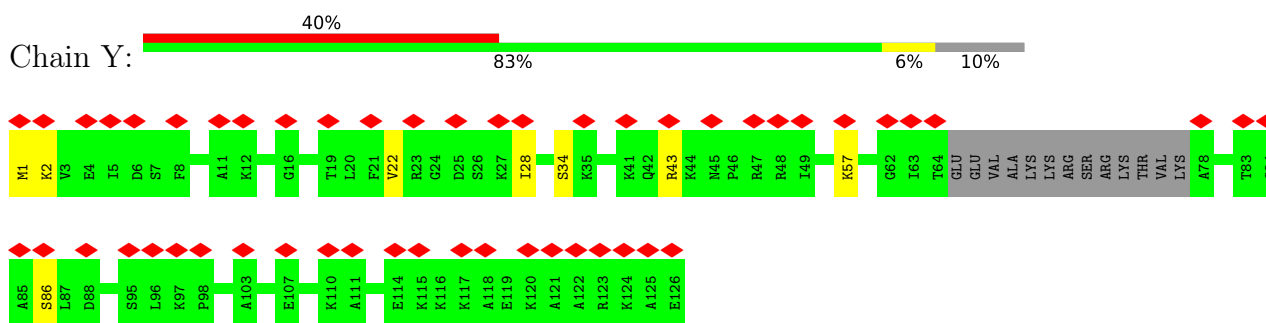
- Molecule 23: Large ribosomal subunit protein eL22A



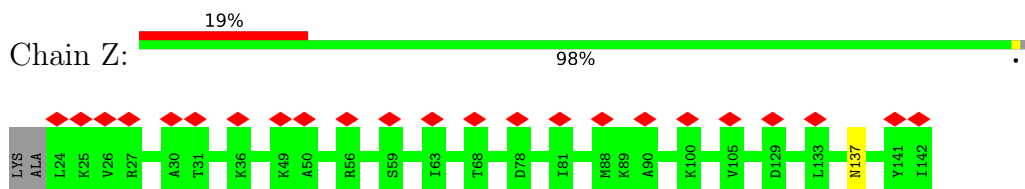
- Molecule 24: Large ribosomal subunit protein uL14A



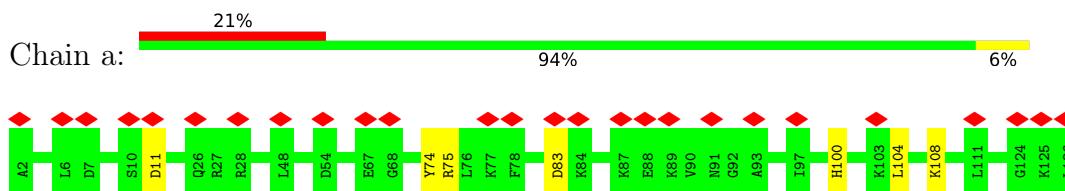
- Molecule 25: Large ribosomal subunit protein eL24A



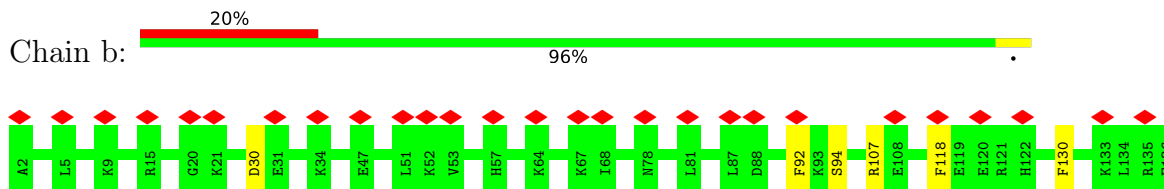
- Molecule 26: Large ribosomal subunit protein uL23



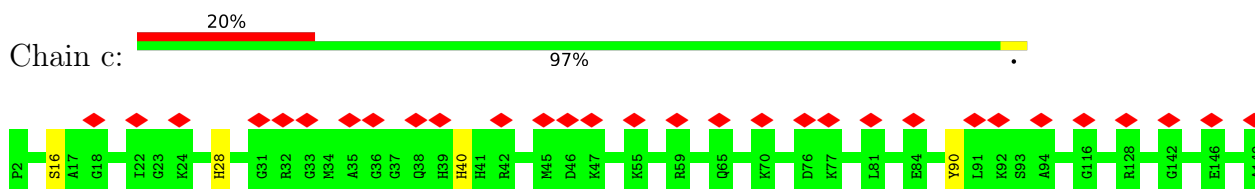
- Molecule 27: Large ribosomal subunit protein uL24A



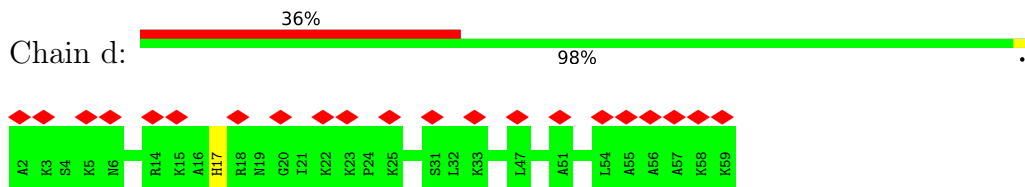
- Molecule 28: Large ribosomal subunit protein eL27A



- Molecule 29: Large ribosomal subunit protein uL15

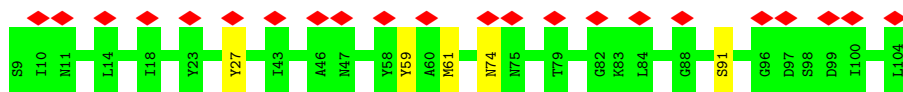


- Molecule 30: Large ribosomal subunit protein eL29

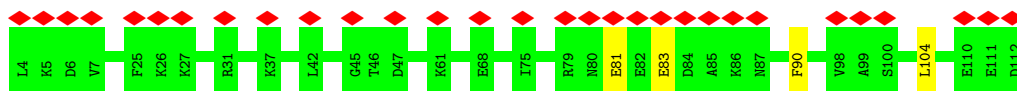
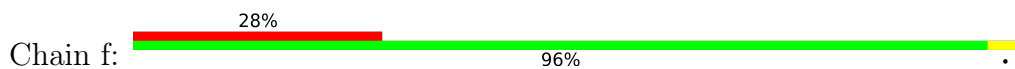


- Molecule 31: Large ribosomal subunit protein eL30

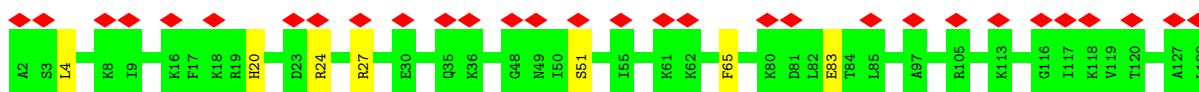
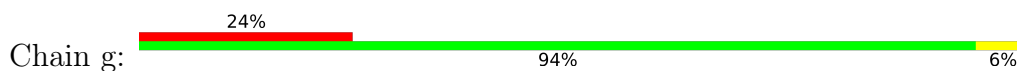




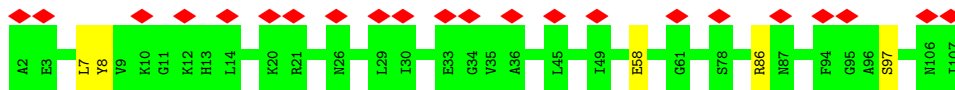
- Molecule 32: Large ribosomal subunit protein eL31A



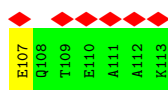
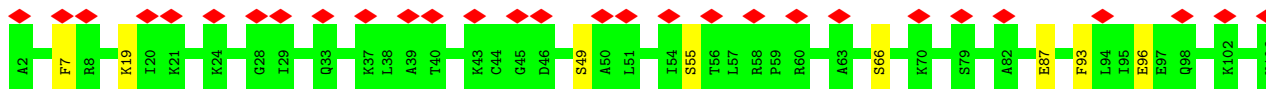
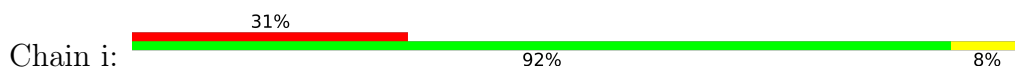
- Molecule 33: Large ribosomal subunit protein eL32



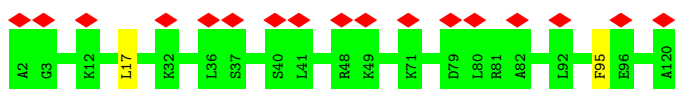
- Molecule 34: Large ribosomal subunit protein eL33A



- Molecule 35: Large ribosomal subunit protein eL34A

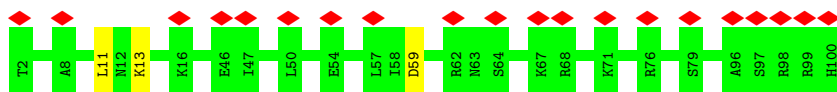


- Molecule 36: Large ribosomal subunit protein uL29A

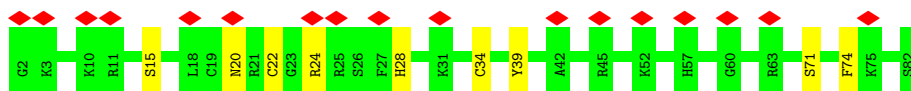
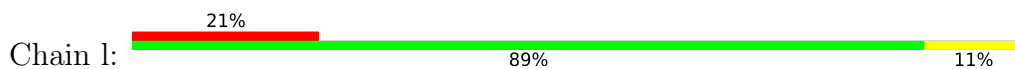


- Molecule 37: Large ribosomal subunit protein eL36A

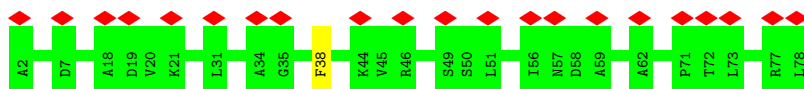




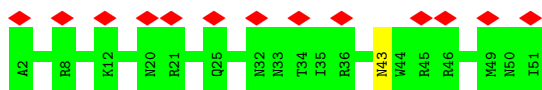
- Molecule 38: Large ribosomal subunit protein eL37A



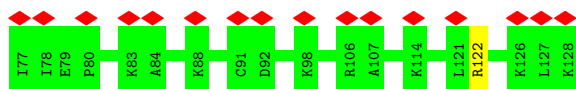
- Molecule 39: Large ribosomal subunit protein eL38



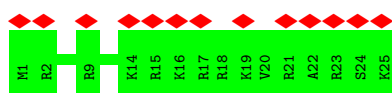
- Molecule 40: Large ribosomal subunit protein eL39



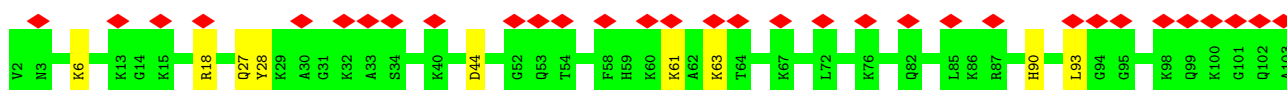
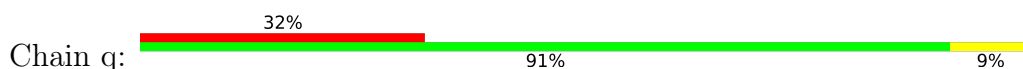
- Molecule 41: Large ribosomal subunit protein eL40A



- Molecule 42: Large ribosomal subunit protein eL41A

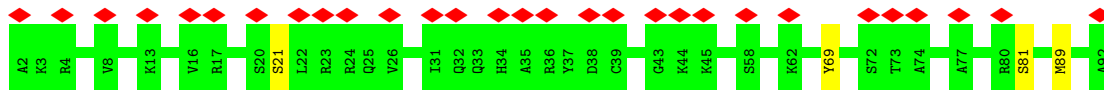


- Molecule 43: Large ribosomal subunit protein eL42A

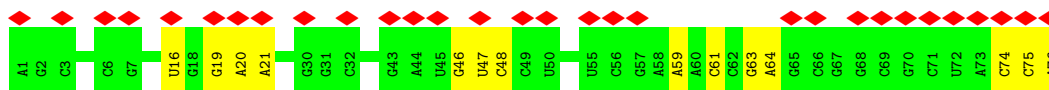
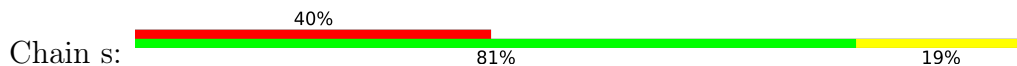


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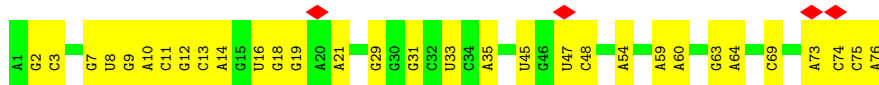
• Molecule 44: Large ribosomal subunit protein eL43A



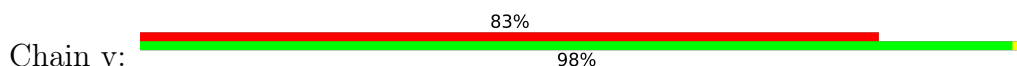
• Molecule 45: tRNA

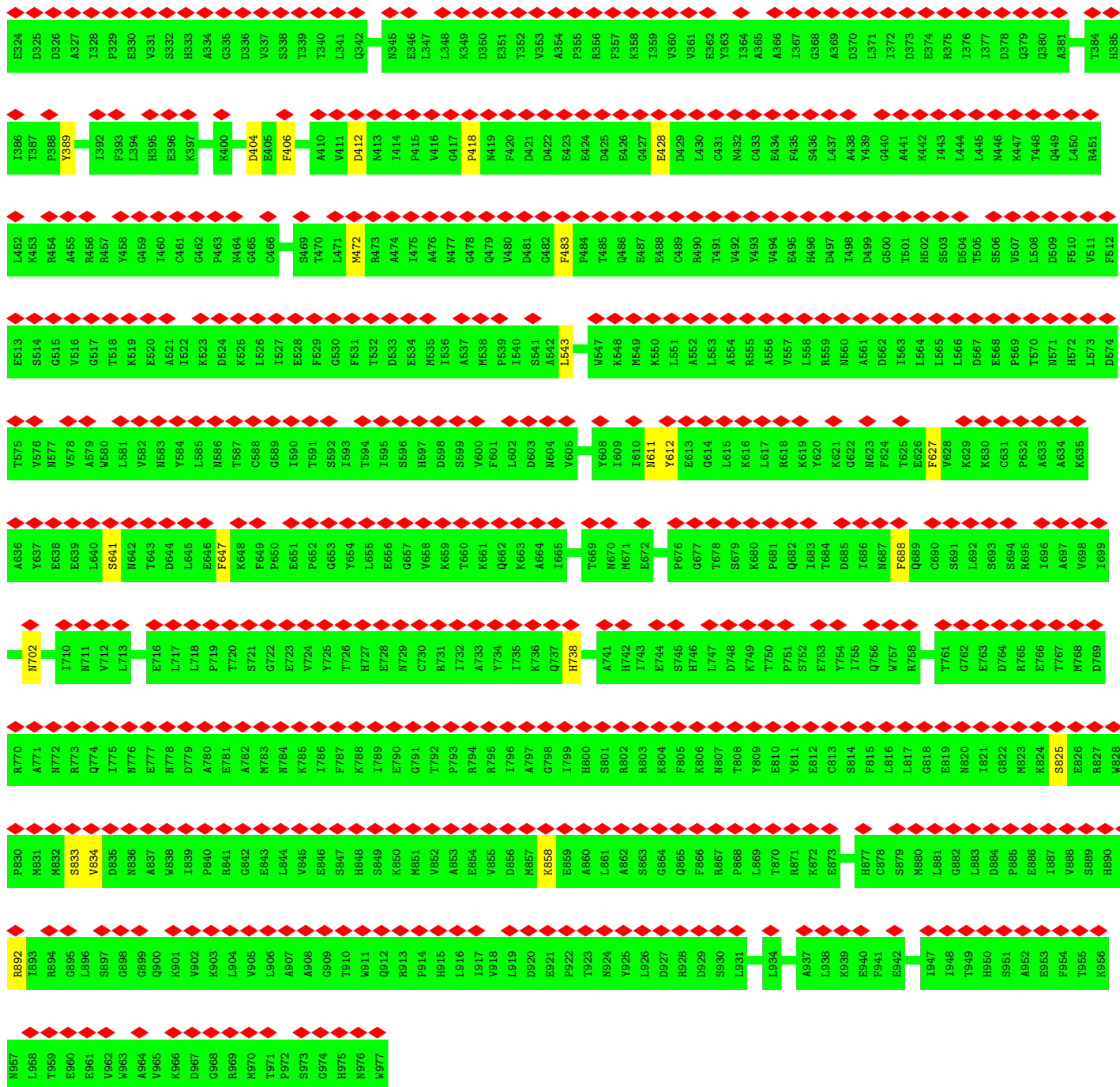


• Molecule 45: tRNA

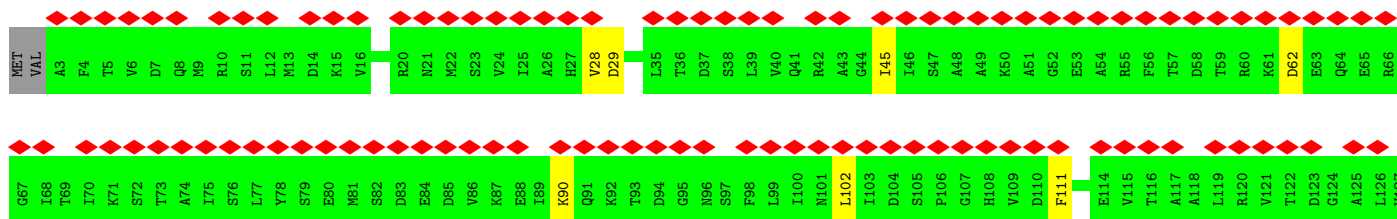
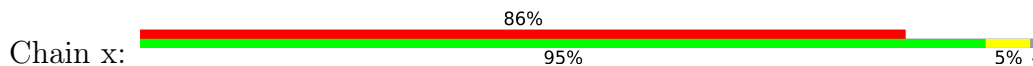


• Molecule 46: Elongation factor 3A





● Molecule 47: Elongation factor 2

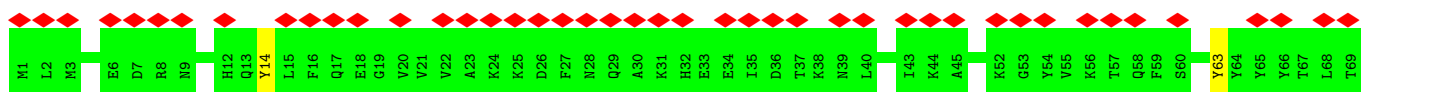


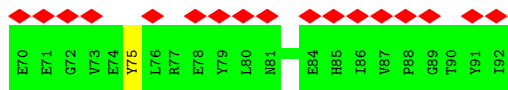


• Molecule 48: Small ribosomal subunit protein eS10A

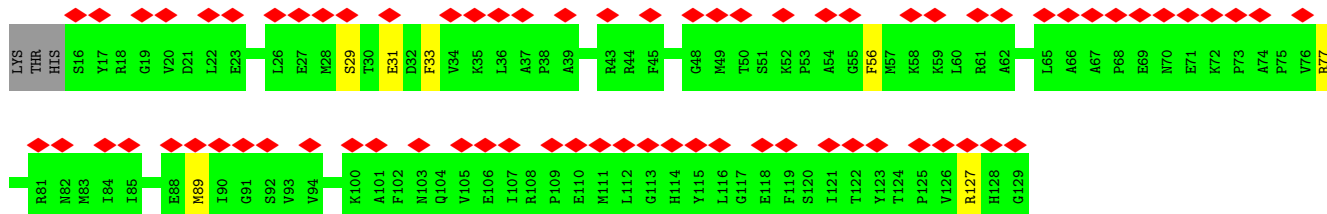
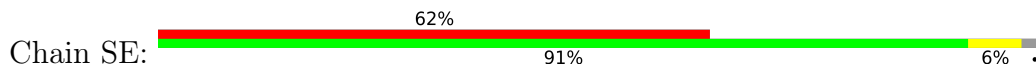


Chain SC:

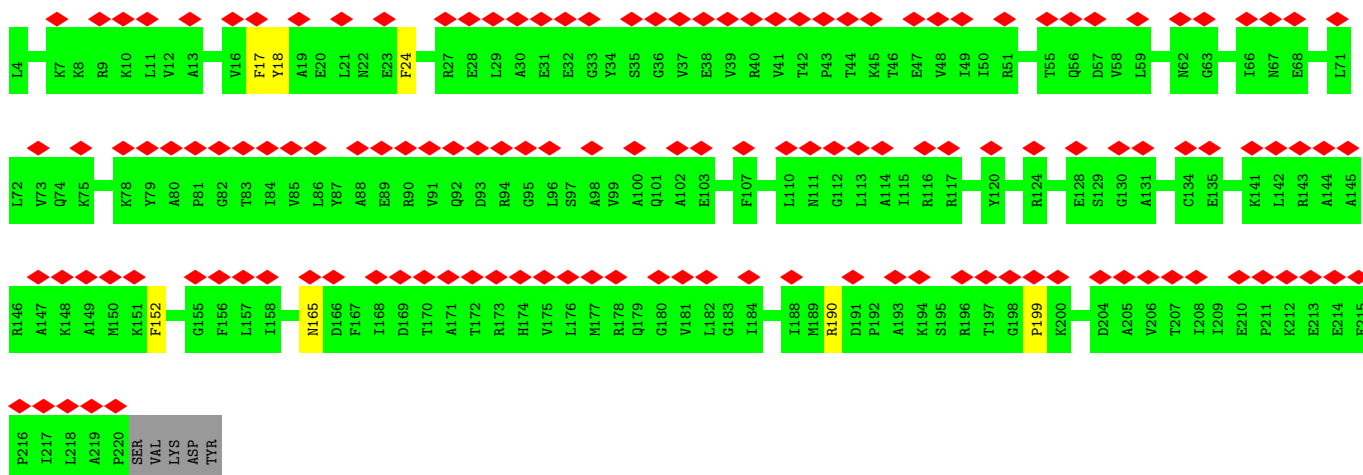




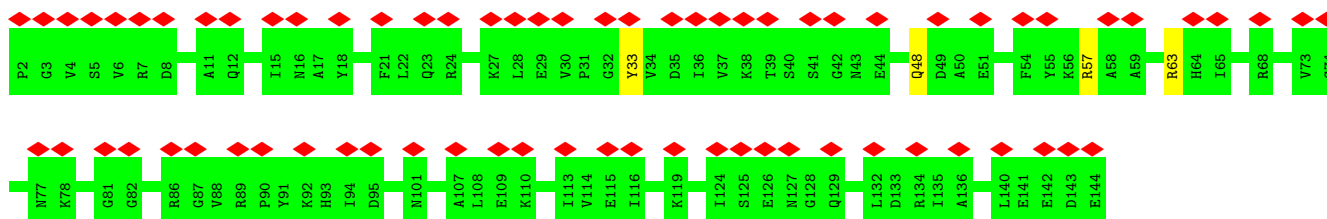
- Molecule 49: Small ribosomal subunit protein uS19



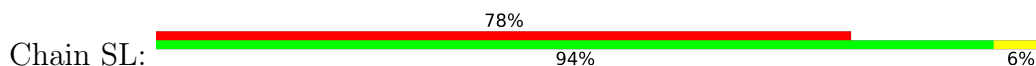
- Molecule 50: Small ribosomal subunit protein uS3



- Molecule 51: Small ribosomal subunit protein eS19A



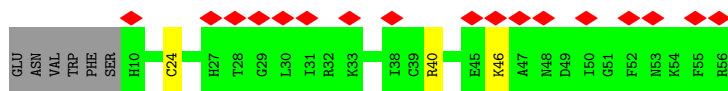
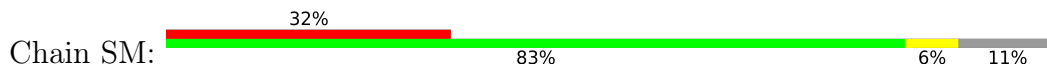
- Molecule 52: Small ribosomal subunit protein eS28A



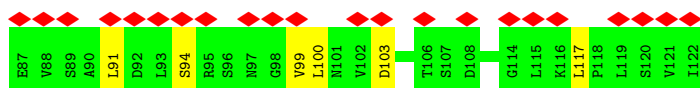
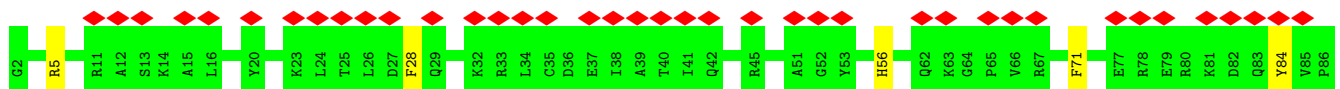
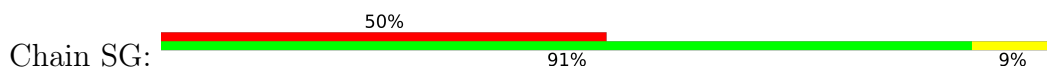




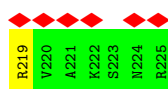
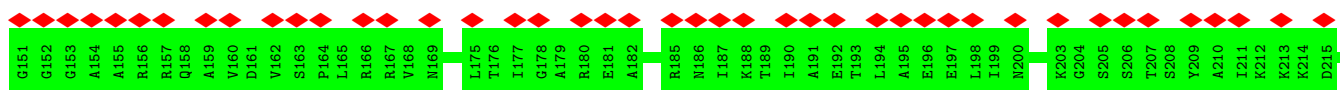
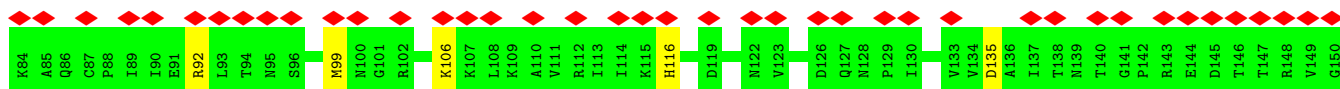
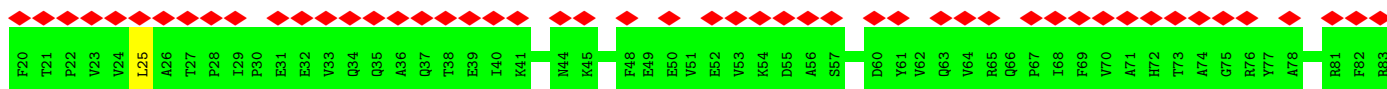
- Molecule 53: Small ribosomal subunit protein uS14A



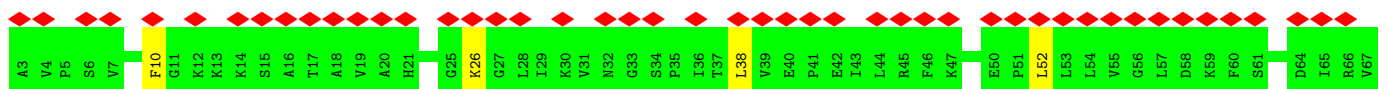
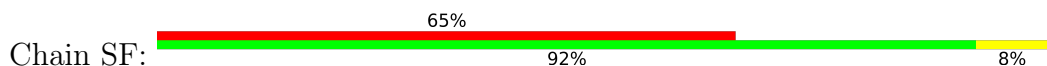
- Molecule 54: Small ribosomal subunit protein eS17A

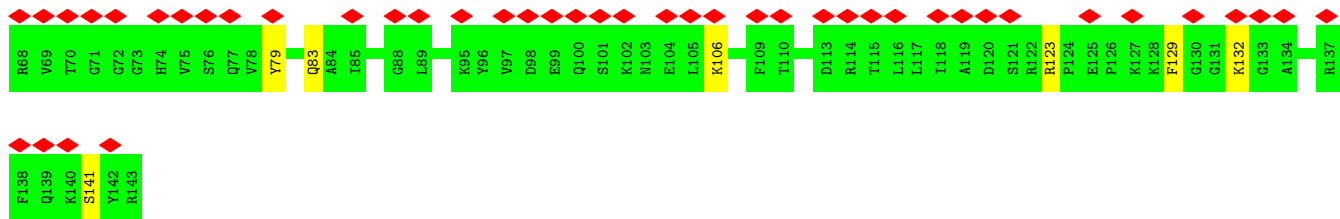


- Molecule 55: Small ribosomal subunit protein uS7

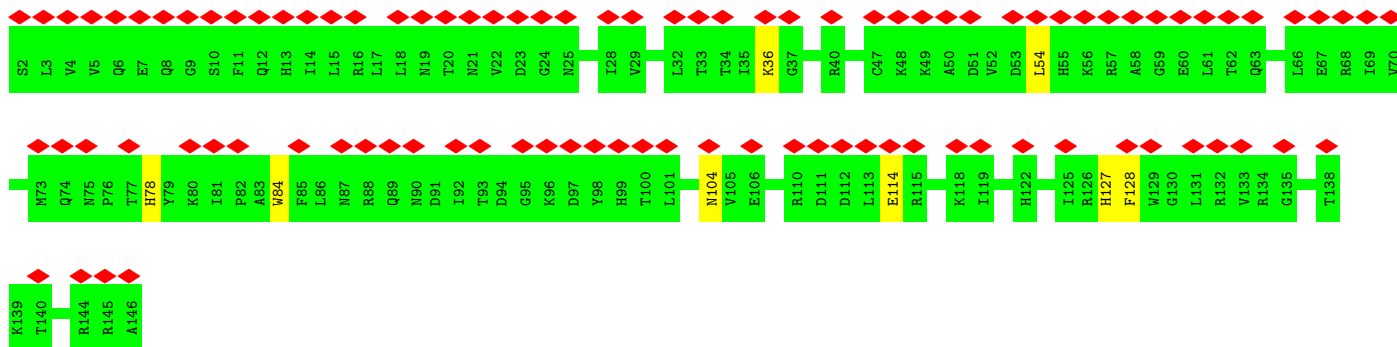


- Molecule 56: Small ribosomal subunit protein uS9A

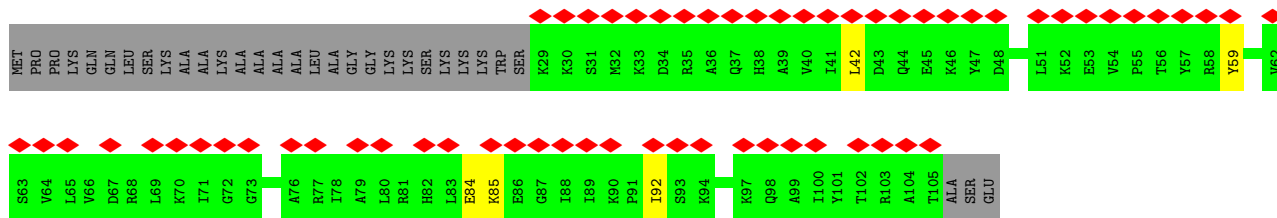




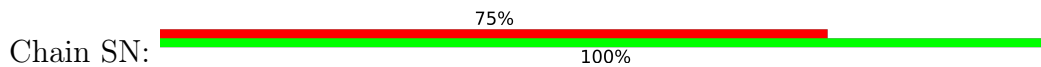
• Molecule 57: Small ribosomal subunit protein uS13A



• Molecule 58: Small ribosomal subunit protein eS25A

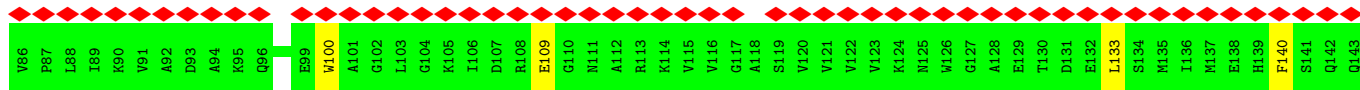
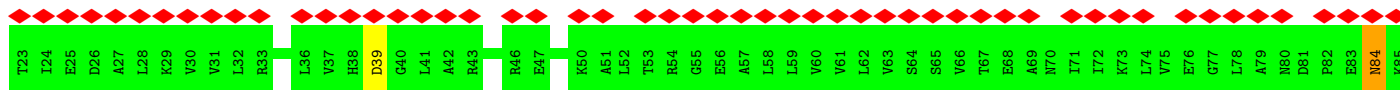


• Molecule 59: Small ribosomal subunit protein eS31

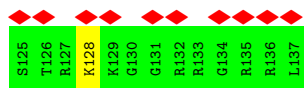
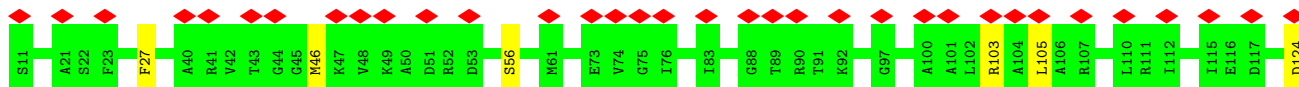


• Molecule 60: Small ribosomal subunit protein eS12

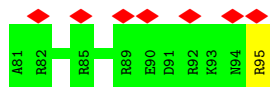
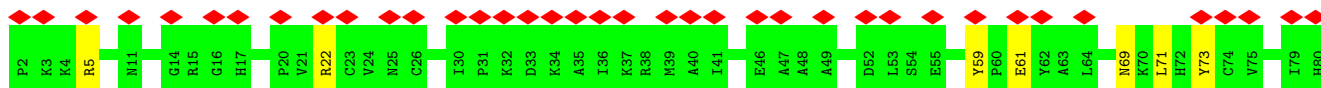
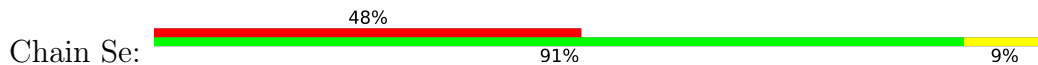




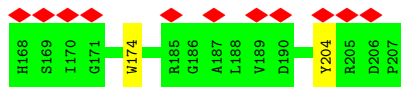
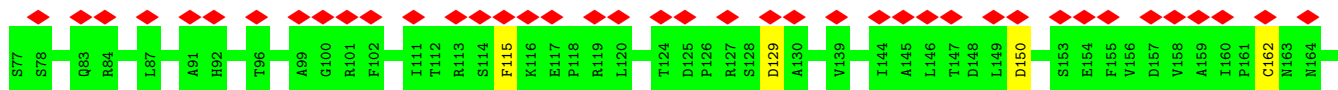
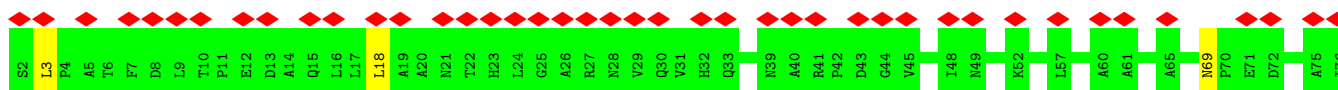
• Molecule 61: Small ribosomal subunit protein uS11B



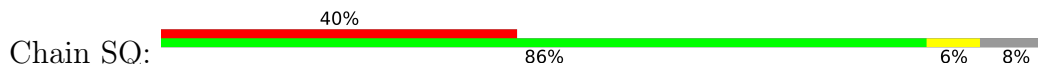
• Molecule 62: Small ribosomal subunit protein eS26A

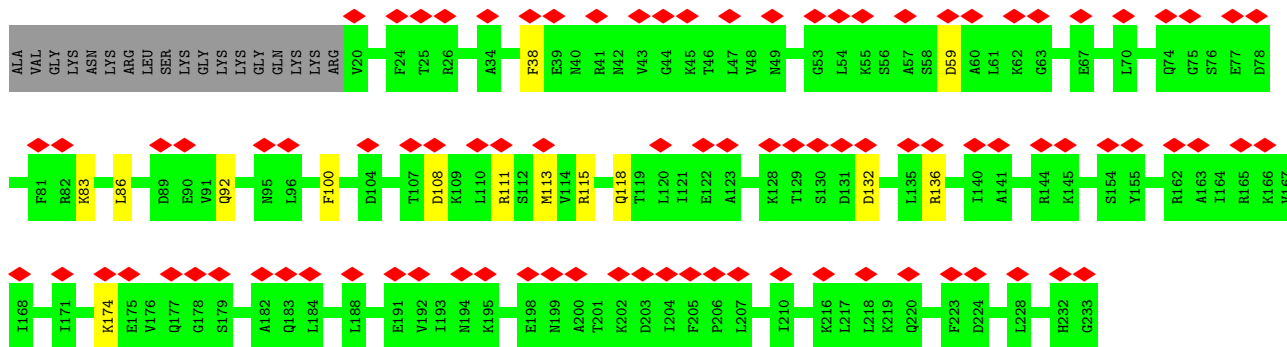


• Molecule 63: Small ribosomal subunit protein uS2A

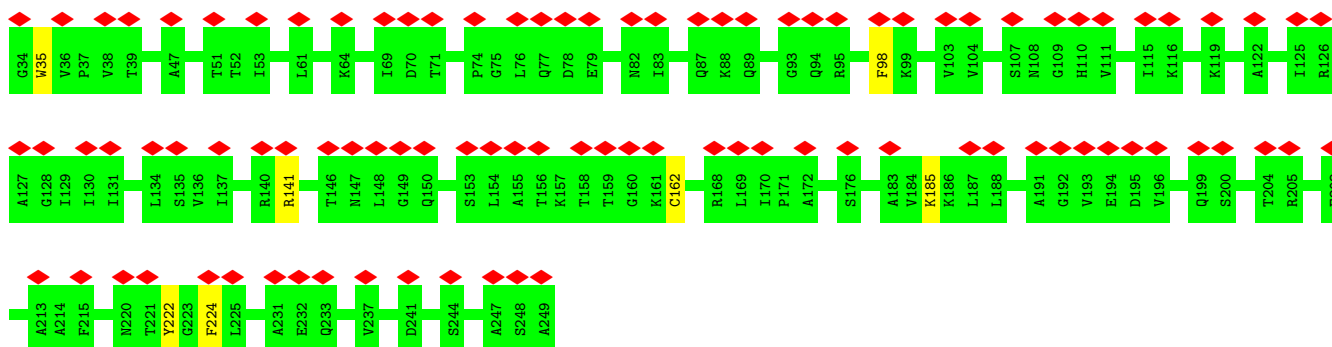


• Molecule 64: Small ribosomal subunit protein eS1A

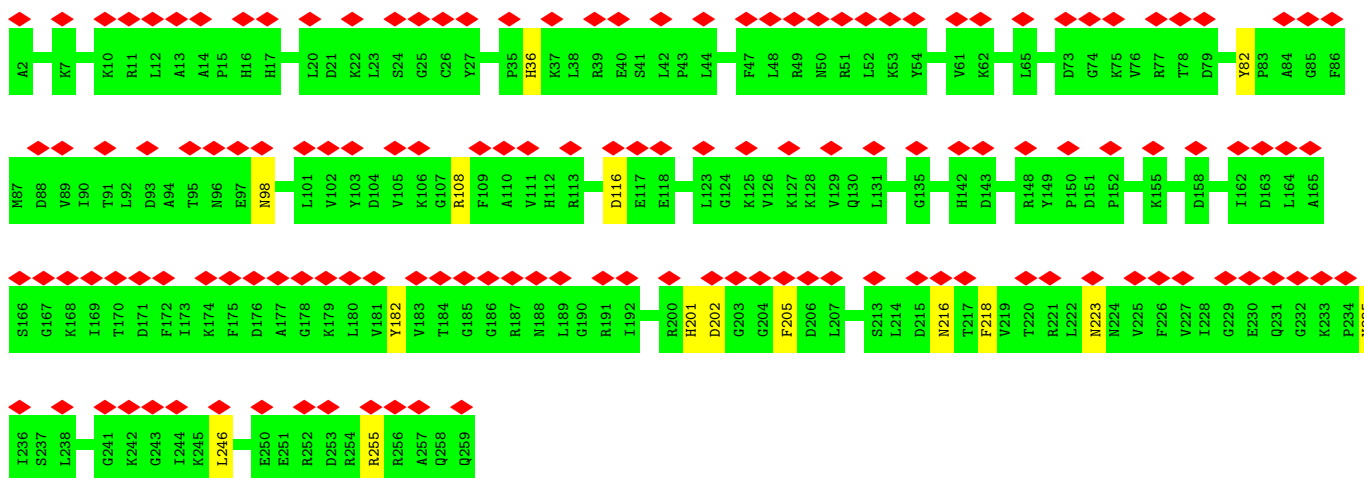




• Molecule 65: Small ribosomal subunit protein uS5

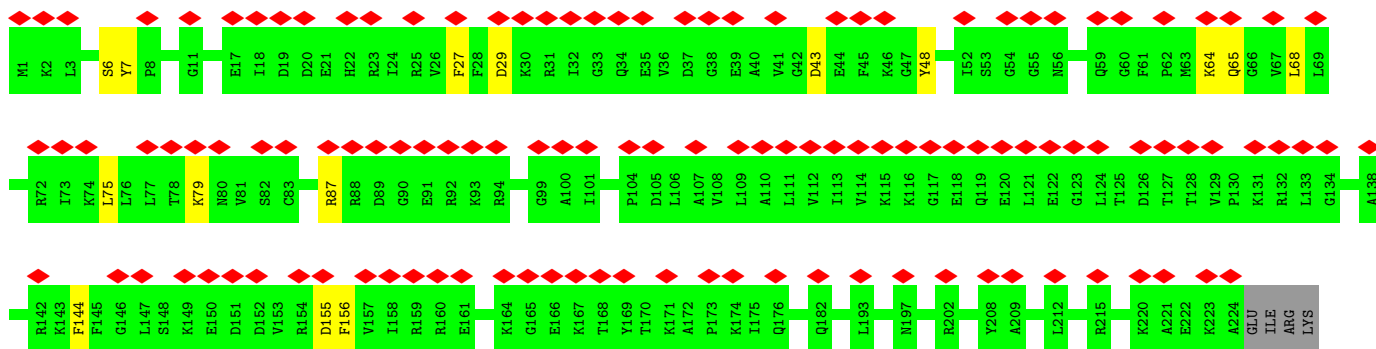


• Molecule 66: Small ribosomal subunit protein eS4A

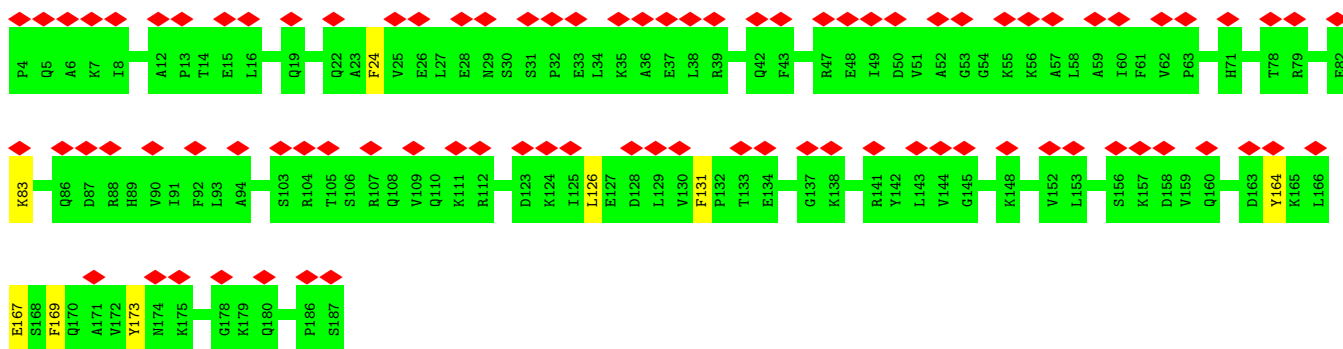


• Molecule 67: Small ribosomal subunit protein eS6A

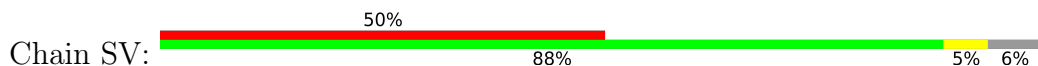




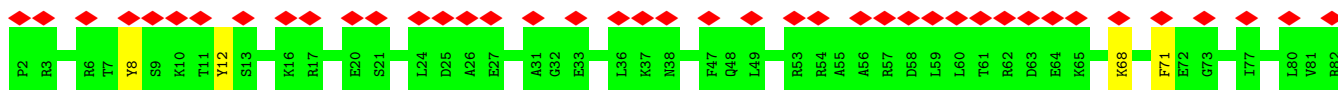
• Molecule 68: Small ribosomal subunit protein eS7A

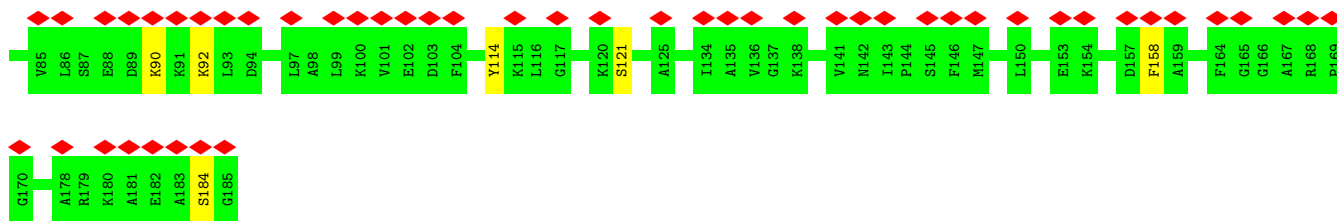


• Molecule 69: Small ribosomal subunit protein eS8A



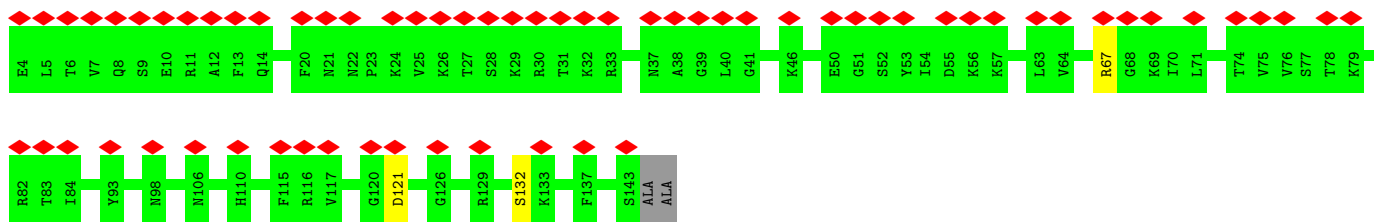
• Molecule 70: Small ribosomal subunit protein uS4A





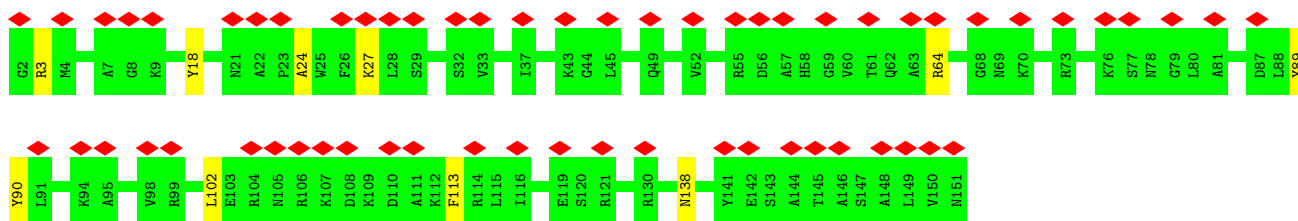
- Molecule 71: Small ribosomal subunit protein uS17A

Chain SX:



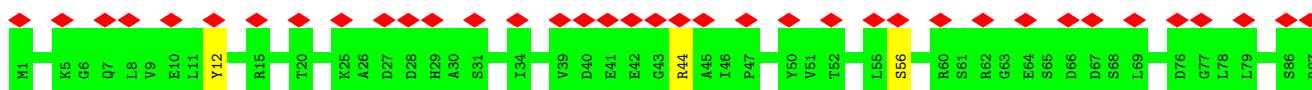
- Molecule 72: Small ribosomal subunit protein uS15

Chain SY:



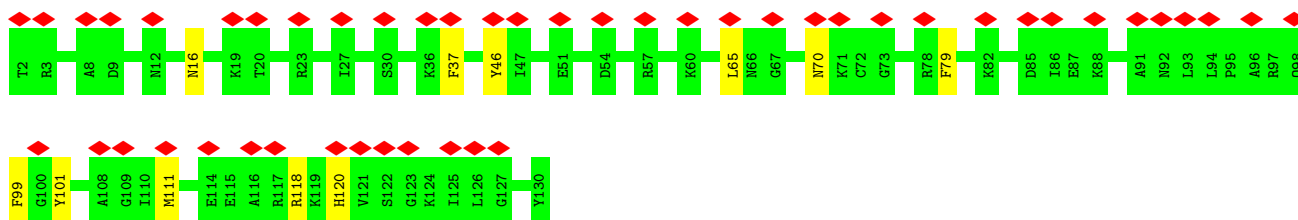
- Molecule 73: Small ribosomal subunit protein eS21A

Chain Sa:

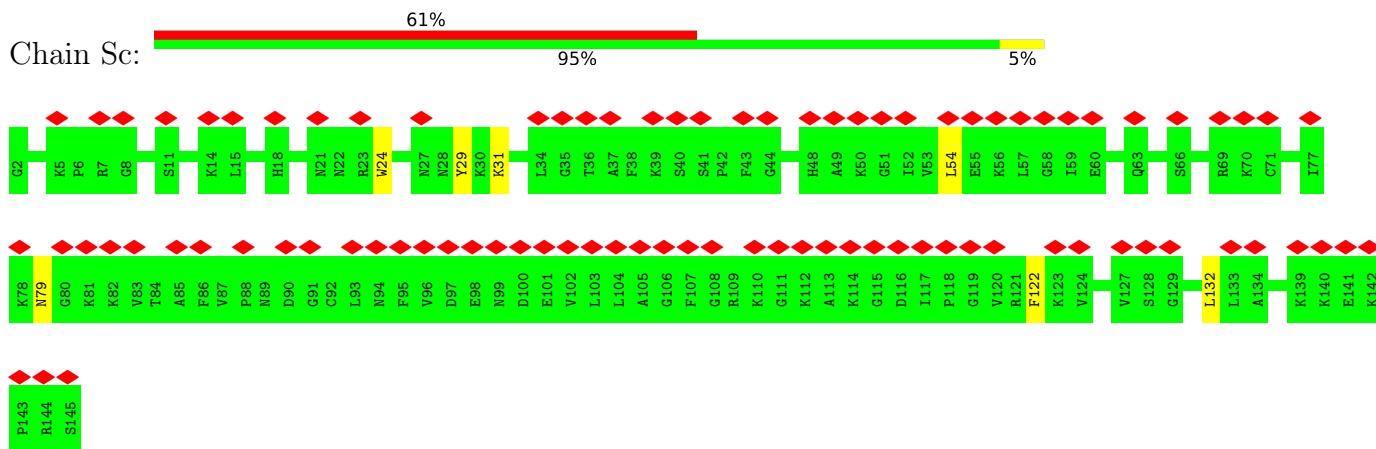


- Molecule 74: Small ribosomal subunit protein uS8A

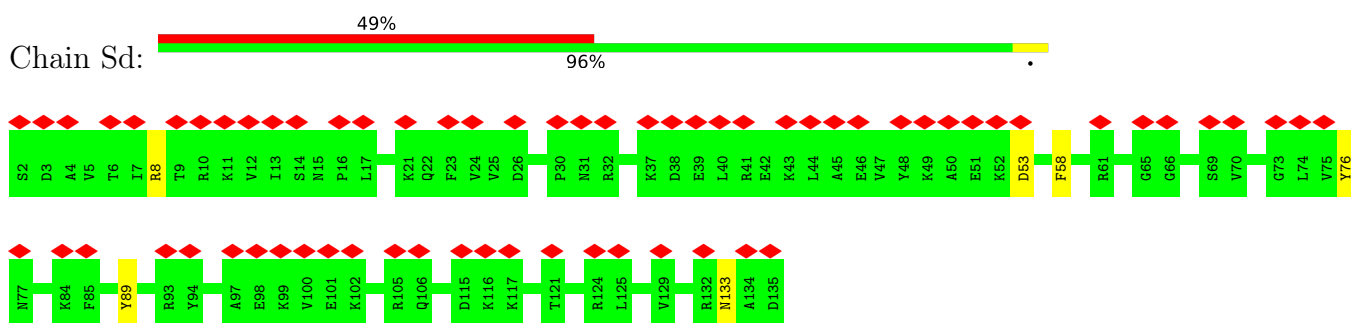
Chain Sb:



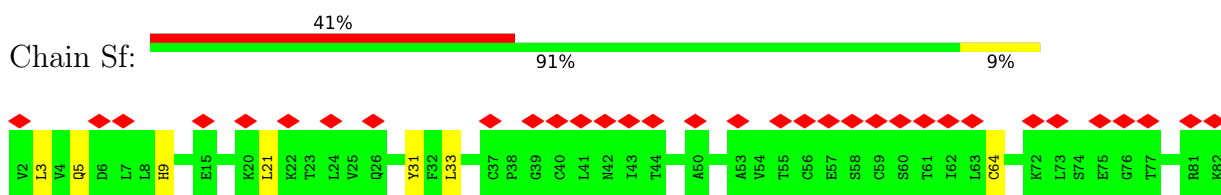
- Molecule 75: Small ribosomal subunit protein uS12A



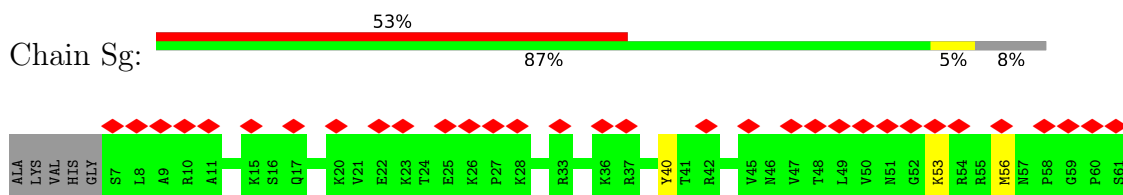
• Molecule 76: Small ribosomal subunit protein eS24A



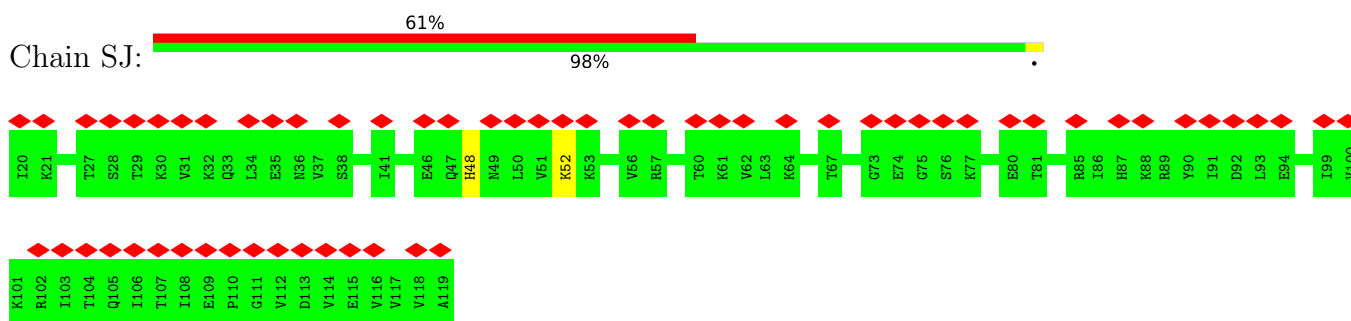
• Molecule 77: Small ribosomal subunit protein eS27A



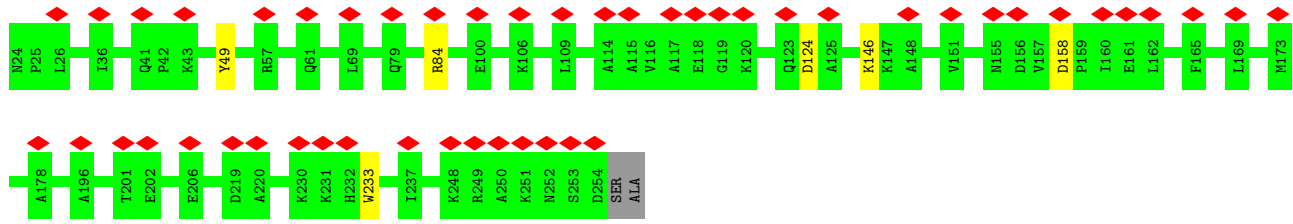
• Molecule 78: Small ribosomal subunit protein eS30A



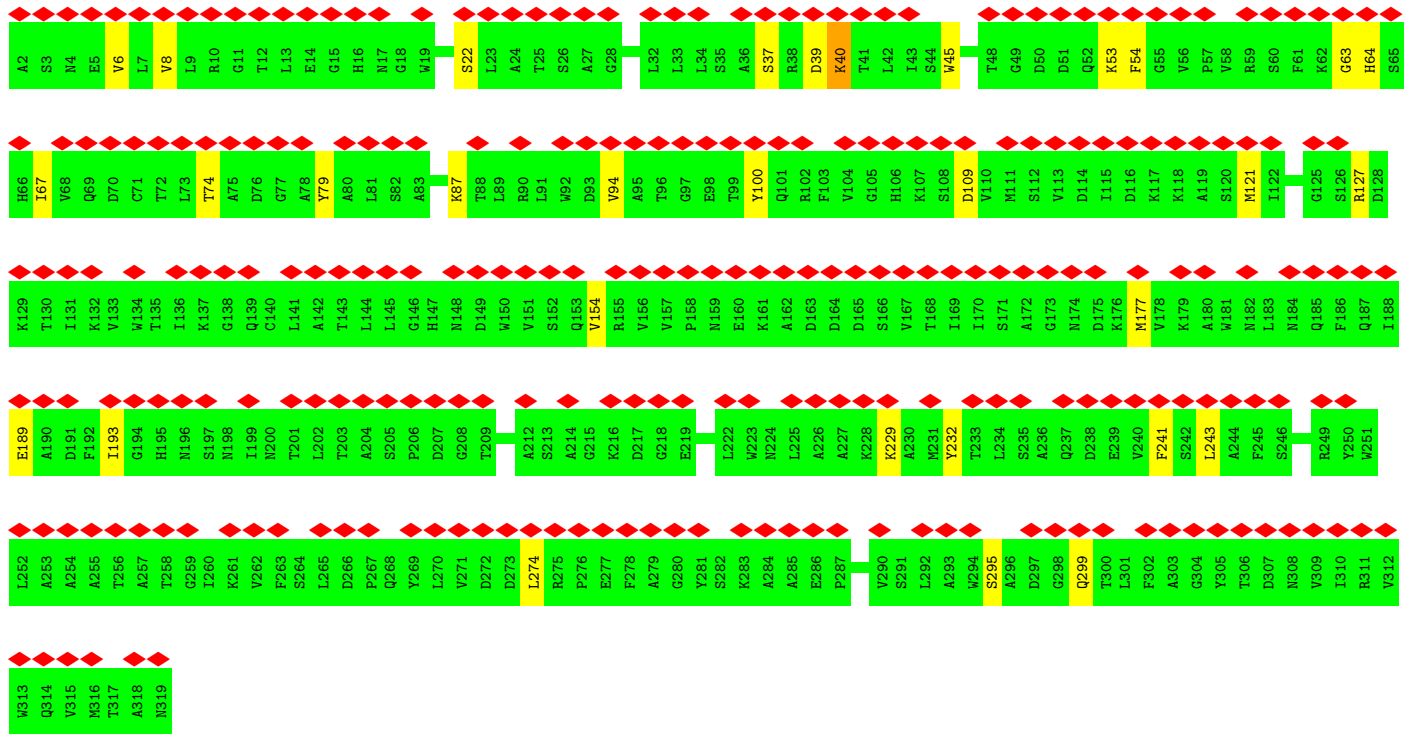
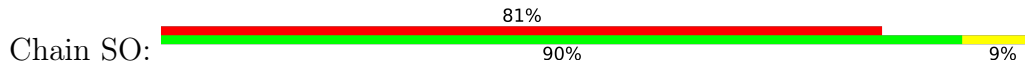
• Molecule 79: Small ribosomal subunit protein uS10



• Molecule 80: Large ribosomal subunit protein eL8A



• Molecule 81: Small ribosomal subunit protein RACK1





## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	8681	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	50	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	Not provided	
Image detector	GATAN K2 QUANTUM (4k x 4k)	Depositor
Maximum map value	1.190	Depositor
Minimum map value	-0.574	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.073	Depositor
Recommended contour level	0.306	Depositor
Map size ( $\text{\AA}$ )	528.0, 528.0, 528.0	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles ( $^\circ$ )	90.0, 90.0, 90.0	wwPDB
Pixel spacing ( $\text{\AA}$ )	1.32, 1.32, 1.32	Depositor

## 5 Model quality i

### 5.1 Standard geometry i

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	S	0.28	0/1465	0.62	2/1965 (0.1%)
2	2	0.17	0/42211	0.76	5/65773 (0.0%)
3	A	0.15	0/76448	0.73	3/119184 (0.0%)
4	B	0.15	0/2883	0.73	0/4491
5	C	0.16	0/3746	0.75	1/5832 (0.0%)
6	D	0.25	0/1897	0.57	0/2550
7	E	0.24	0/3146	0.53	0/4228
8	F	0.25	0/2800	0.53	1/3790 (0.0%)
9	G	0.25	0/2360	0.55	2/3185 (0.1%)
10	H	0.25	0/1329	0.53	0/1794
11	I	0.27	0/1821	0.58	0/2451
12	K	0.26	0/1514	0.58	1/2039 (0.0%)
13	L	0.27	0/1801	0.60	2/2416 (0.1%)
14	M	0.26	0/1367	0.66	1/1834 (0.1%)
15	N	0.24	0/1568	0.58	0/2106
16	O	0.25	0/1068	0.56	0/1438
17	P	0.25	0/1757	0.61	0/2354
18	Q	0.27	0/1585	0.56	0/2128
19	R	0.25	0/1439	0.56	0/1938
20	T	0.25	0/1501	0.59	0/2002
21	U	0.25	0/1473	0.55	0/1980
22	V	0.26	0/1276	0.57	0/1712
23	W	0.27	0/812	0.54	0/1099
24	X	0.28	0/996	0.61	0/1340
25	Y	0.26	0/784	0.56	0/1058
26	Z	0.27	0/969	0.56	0/1307
27	a	0.24	0/995	0.56	0/1329
28	b	0.27	0/1106	0.53	0/1485
29	c	0.25	0/1200	0.57	0/1607
30	d	0.24	0/473	0.48	0/629
31	e	0.27	0/745	0.56	0/1001
32	f	0.28	0/890	0.61	1/1196 (0.1%)
33	g	0.24	0/1034	0.55	0/1385
34	h	0.27	0/868	0.60	0/1168

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
35	i	0.26	0/890	0.63	0/1189
36	j	0.25	0/978	0.63	0/1301
37	k	0.27	0/772	0.66	1/1026 (0.1%)
38	l	0.25	0/660	0.62	0/875
39	m	0.26	0/618	0.59	0/826
40	n	0.27	0/443	0.66	0/588
41	o	0.25	0/416	0.60	0/553
42	p	0.27	0/230	0.77	0/296
43	q	0.26	0/836	0.56	1/1104 (0.1%)
44	r	0.27	0/701	0.66	0/934
45	s	0.14	0/1795	0.74	0/2797
45	t	0.18	0/1796	0.78	0/2799
46	v	0.24	0/7611	0.51	1/10322 (0.0%)
47	x	0.25	0/6645	0.55	0/8996
48	SC	0.25	0/769	0.52	0/1039
49	SE	0.26	0/913	0.60	0/1227
50	SA	0.25	0/1711	0.57	0/2303
51	SI	0.25	0/1130	0.59	0/1517
52	SL	0.23	0/493	0.64	0/663
53	SM	0.26	0/394	0.65	0/520
54	SG	0.27	0/971	0.67	0/1303
55	SB	0.25	0/1625	0.54	0/2197
56	SF	0.25	0/1125	0.55	0/1510
57	SH	0.25	0/1207	0.58	0/1623
58	SK	0.26	0/616	0.61	0/828
59	SN	0.23	0/571	0.53	0/768
60	SD	0.26	0/883	0.58	0/1199
61	SZ	0.26	0/901	0.64	0/1217
62	Se	0.29	0/761	0.68	0/1016
63	SP	0.25	0/1644	0.54	0/2249
64	SQ	0.26	0/1735	0.58	0/2335
65	SR	0.25	0/1656	0.55	0/2251
66	SS	0.24	0/2097	0.56	0/2823
67	ST	0.25	0/1813	0.57	1/2425 (0.0%)
68	SU	0.25	0/1498	0.53	0/2019
69	SV	0.25	0/1501	0.58	1/2006 (0.0%)
70	SW	0.24	0/1504	0.59	0/2016
71	SX	0.24	0/1158	0.55	0/1561
72	SY	0.25	0/1215	0.58	0/1638
73	Sa	0.26	0/682	0.58	0/921
74	Sb	0.29	0/1038	0.64	0/1395
75	Sc	0.27	0/1139	0.61	0/1518
76	Sd	0.25	0/1087	0.56	0/1449

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
77	Sf	0.25	0/620	0.58	0/838
78	Sg	0.25	0/444	0.62	0/591
79	SJ	0.26	0/807	0.57	0/1091
80	J	0.25	0/1825	0.52	0/2466
81	SO	0.57	1/2489 (0.0%)	0.93	2/3389 (0.1%)
All	All	0.21	1/231740 (0.0%)	0.68	26/339311 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
81	SO	54	PHE	CE1-CZ	5.94	1.48	1.37

All (26) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
81	SO	274	LEU	CA-CB-CG	5.98	129.06	115.30
8	F	318	LEU	CA-CB-CG	5.89	128.84	115.30
81	SO	243	LEU	CA-CB-CG	5.86	128.77	115.30
14	M	84	LEU	CA-CB-CG	5.84	128.74	115.30
2	2	965	U	C2-N1-C1'	5.78	124.64	117.70
2	2	1706	C	N3-C2-O2	-5.72	117.90	121.90
32	f	83	GLU	CA-CB-CG	5.61	125.74	113.40
2	2	186	C	C2-N1-C1'	5.58	124.94	118.80
9	G	104	LEU	CA-CB-CG	5.49	127.93	115.30
3	A	1175	C	N1-C2-O2	5.49	122.19	118.90
46	v	543	LEU	CA-CB-CG	5.46	127.87	115.30
67	ST	68	LEU	CA-CB-CG	5.34	127.59	115.30
5	C	21	C	C2-N1-C1'	5.33	124.66	118.80
69	SV	189	LEU	CA-CB-CG	5.33	127.56	115.30
13	L	160	PRO	CA-N-CD	-5.29	104.09	111.50
2	2	400	A	OP2-P-O3'	5.29	116.83	105.20
2	2	555	A	OP1-P-O3'	5.26	116.77	105.20
3	A	2773	C	N1-C2-O2	5.23	122.04	118.90
1	S	29	LEU	CA-CB-CG	5.17	127.20	115.30
13	L	91	VAL	C-N-CA	-5.16	108.80	121.70
9	G	115	LEU	CA-CB-CG	5.14	127.12	115.30
3	A	3306	U	C2-N1-C1'	5.12	123.84	117.70
12	K	1	MET	CA-CB-CG	5.11	121.98	113.30
37	k	59	ASP	CB-CG-OD1	5.07	122.86	118.30
1	S	20	LYS	CA-CB-CG	5.05	124.52	113.40
43	q	93	LEU	CA-CB-CG	5.02	126.85	115.30

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-close contacts [i](#)

Due to software issues we are unable to calculate clashes - this section is therefore empty.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	S	183/185 (99%)	171 (93%)	11 (6%)	1 (0%)	25	60
6	D	243/251 (97%)	230 (95%)	13 (5%)	0	100	100
7	E	384/386 (100%)	366 (95%)	18 (5%)	0	100	100
8	F	359/361 (99%)	350 (98%)	9 (2%)	0	100	100
9	G	286/294 (97%)	265 (93%)	20 (7%)	1 (0%)	37	70
10	H	163/175 (93%)	154 (94%)	9 (6%)	0	100	100
11	I	220/223 (99%)	213 (97%)	7 (3%)	0	100	100
12	K	186/191 (97%)	173 (93%)	13 (7%)	0	100	100
13	L	216/218 (99%)	202 (94%)	14 (6%)	0	100	100
14	M	167/169 (99%)	152 (91%)	14 (8%)	1 (1%)	22	57
15	N	191/193 (99%)	178 (93%)	12 (6%)	1 (0%)	25	60
16	O	134/136 (98%)	127 (95%)	7 (5%)	0	100	100
17	P	201/203 (99%)	192 (96%)	9 (4%)	0	100	100
18	Q	195/197 (99%)	190 (97%)	5 (3%)	0	100	100
19	R	181/183 (99%)	171 (94%)	10 (6%)	0	100	100
20	T	182/188 (97%)	178 (98%)	4 (2%)	0	100	100
21	U	169/171 (99%)	160 (95%)	9 (5%)	0	100	100
22	V	155/159 (98%)	141 (91%)	14 (9%)	0	100	100

*Continued on next page...*

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
23	W	98/100 (98%)	91 (93%)	7 (7%)	0	100	100
24	X	130/136 (96%)	122 (94%)	8 (6%)	0	100	100
25	Y	109/126 (86%)	92 (84%)	14 (13%)	3 (3%)	4	28
26	Z	117/121 (97%)	111 (95%)	6 (5%)	0	100	100
27	a	123/125 (98%)	114 (93%)	9 (7%)	0	100	100
28	b	133/135 (98%)	127 (96%)	6 (4%)	0	100	100
29	c	146/148 (99%)	133 (91%)	13 (9%)	0	100	100
30	d	56/58 (97%)	53 (95%)	3 (5%)	0	100	100
31	e	94/96 (98%)	92 (98%)	2 (2%)	0	100	100
32	f	107/109 (98%)	100 (94%)	7 (6%)	0	100	100
33	g	125/127 (98%)	123 (98%)	2 (2%)	0	100	100
34	h	104/106 (98%)	97 (93%)	7 (7%)	0	100	100
35	i	110/112 (98%)	107 (97%)	3 (3%)	0	100	100
36	j	117/119 (98%)	110 (94%)	7 (6%)	0	100	100
37	k	97/99 (98%)	94 (97%)	3 (3%)	0	100	100
38	l	79/81 (98%)	73 (92%)	6 (8%)	0	100	100
39	m	75/77 (97%)	72 (96%)	3 (4%)	0	100	100
40	n	48/50 (96%)	46 (96%)	2 (4%)	0	100	100
41	o	50/52 (96%)	47 (94%)	3 (6%)	0	100	100
42	p	23/25 (92%)	23 (100%)	0	0	100	100
43	q	101/103 (98%)	98 (97%)	3 (3%)	0	100	100
44	r	89/91 (98%)	86 (97%)	3 (3%)	0	100	100
46	v	975/977 (100%)	877 (90%)	94 (10%)	4 (0%)	30	65
47	x	833/842 (99%)	731 (88%)	96 (12%)	6 (1%)	19	54
48	SC	90/92 (98%)	83 (92%)	7 (8%)	0	100	100
49	SE	112/117 (96%)	103 (92%)	9 (8%)	0	100	100
50	SA	215/222 (97%)	207 (96%)	7 (3%)	1 (0%)	25	60
51	SI	141/143 (99%)	135 (96%)	6 (4%)	0	100	100
52	SL	61/63 (97%)	55 (90%)	6 (10%)	0	100	100
53	SM	45/53 (85%)	33 (73%)	12 (27%)	0	100	100
54	SG	119/121 (98%)	94 (79%)	21 (18%)	4 (3%)	3	25

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
55	SB	204/206 (99%)	194 (95%)	10 (5%)	0	100	100
56	SF	139/141 (99%)	128 (92%)	11 (8%)	0	100	100
57	SH	143/145 (99%)	138 (96%)	5 (4%)	0	100	100
58	SK	75/108 (69%)	69 (92%)	5 (7%)	1 (1%)	10	41
59	SN	71/73 (97%)	59 (83%)	12 (17%)	0	100	100
60	SD	119/121 (98%)	96 (81%)	21 (18%)	2 (2%)	7	36
61	SZ	125/127 (98%)	113 (90%)	12 (10%)	0	100	100
62	Se	92/94 (98%)	65 (71%)	26 (28%)	1 (1%)	12	45
63	SP	204/206 (99%)	179 (88%)	25 (12%)	0	100	100
64	SQ	212/232 (91%)	199 (94%)	13 (6%)	0	100	100
65	SR	214/216 (99%)	202 (94%)	12 (6%)	0	100	100
66	SS	256/258 (99%)	242 (94%)	14 (6%)	0	100	100
67	ST	222/228 (97%)	207 (93%)	15 (7%)	0	100	100
68	SU	182/184 (99%)	169 (93%)	13 (7%)	0	100	100
69	SV	183/200 (92%)	175 (96%)	8 (4%)	0	100	100
70	SW	182/184 (99%)	174 (96%)	8 (4%)	0	100	100
71	SX	138/142 (97%)	131 (95%)	7 (5%)	0	100	100
72	SY	148/150 (99%)	140 (95%)	6 (4%)	2 (1%)	9	39
73	Sa	85/87 (98%)	77 (91%)	8 (9%)	0	100	100
74	Sb	127/129 (98%)	117 (92%)	10 (8%)	0	100	100
75	Sc	142/144 (99%)	133 (94%)	9 (6%)	0	100	100
76	Sd	132/134 (98%)	126 (96%)	6 (4%)	0	100	100
77	Sf	79/81 (98%)	72 (91%)	7 (9%)	0	100	100
78	Sg	53/60 (88%)	47 (89%)	6 (11%)	0	100	100
79	SJ	98/100 (98%)	92 (94%)	6 (6%)	0	100	100
80	J	229/233 (98%)	220 (96%)	8 (4%)	1 (0%)	30	65
81	SO	316/318 (99%)	201 (64%)	106 (34%)	9 (3%)	4	28
All	All	12707/13010 (98%)	11707 (92%)	962 (8%)	38 (0%)	38	70

All (38) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
25	Y	22	VAL

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Mol	Chain	Res	Type
25	Y	86	SER
46	v	418	PRO
46	v	833	SER
54	SG	84	TYR
47	x	45	ILE
47	x	166	GLU
54	SG	94	SER
54	SG	99	VAL
58	SK	92	ILE
80	J	158	ASP
81	SO	100	TYR
47	x	226	ALA
60	SD	109	GLU
9	G	139	PRO
46	v	825	SER
50	SA	199	PRO
81	SO	74	THR
81	SO	94	VAL
81	SO	295	SER
1	S	18	ALA
15	N	47	ALA
46	v	834	VAL
47	x	485	VAL
62	Se	61	GLU
72	SY	138	ASN
81	SO	39	ASP
81	SO	40	LYS
14	M	22	SER
60	SD	84	ASN
72	SY	24	ALA
81	SO	63	GLY
81	SO	154	VAL
25	Y	28	ILE
47	x	209	VAL
81	SO	6	VAL
47	x	28	VAL
54	SG	117	LEU

### 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	S	150/150 (100%)	143 (95%)	7 (5%)	22	47
6	D	188/193 (97%)	182 (97%)	6 (3%)	34	56
7	E	320/322 (99%)	306 (96%)	14 (4%)	24	48
8	F	288/288 (100%)	279 (97%)	9 (3%)	35	56
9	G	238/243 (98%)	226 (95%)	12 (5%)	20	45
10	H	139/154 (90%)	132 (95%)	7 (5%)	20	45
11	I	186/187 (100%)	174 (94%)	12 (6%)	14	39
12	K	168/171 (98%)	163 (97%)	5 (3%)	36	58
13	L	185/185 (100%)	178 (96%)	7 (4%)	28	52
14	M	145/147 (99%)	136 (94%)	9 (6%)	15	40
15	N	154/154 (100%)	151 (98%)	3 (2%)	52	70
16	O	107/107 (100%)	102 (95%)	5 (5%)	22	47
17	P	175/175 (100%)	163 (93%)	12 (7%)	13	37
18	Q	160/160 (100%)	149 (93%)	11 (7%)	13	37
19	R	138/145 (95%)	133 (96%)	5 (4%)	30	54
20	T	149/153 (97%)	143 (96%)	6 (4%)	27	51
21	U	155/155 (100%)	144 (93%)	11 (7%)	12	36
22	V	133/136 (98%)	130 (98%)	3 (2%)	45	64
23	W	87/87 (100%)	81 (93%)	6 (7%)	13	37
24	X	102/104 (98%)	97 (95%)	5 (5%)	21	46
25	Y	56/108 (52%)	51 (91%)	5 (9%)	8	29
26	Z	104/105 (99%)	103 (99%)	1 (1%)	73	81
27	a	108/108 (100%)	101 (94%)	7 (6%)	14	39
28	b	112/115 (97%)	106 (95%)	6 (5%)	18	44
29	c	117/118 (99%)	113 (97%)	4 (3%)	32	55
30	d	46/46 (100%)	45 (98%)	1 (2%)	47	65
31	e	81/81 (100%)	76 (94%)	5 (6%)	15	40
32	f	92/96 (96%)	89 (97%)	3 (3%)	33	56
33	g	107/109 (98%)	100 (94%)	7 (6%)	14	39

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
34	h	90/90 (100%)	85 (94%)	5 (6%)	17	43
35	i	95/95 (100%)	86 (90%)	9 (10%)	7	25
36	j	104/104 (100%)	102 (98%)	2 (2%)	52	70
37	k	80/81 (99%)	78 (98%)	2 (2%)	42	62
38	l	67/67 (100%)	58 (87%)	9 (13%)	3	17
39	m	68/68 (100%)	67 (98%)	1 (2%)	60	74
40	n	45/45 (100%)	44 (98%)	1 (2%)	47	65
41	o	45/47 (96%)	44 (98%)	1 (2%)	47	65
42	p	22/23 (96%)	22 (100%)	0	100	100
43	q	87/88 (99%)	79 (91%)	8 (9%)	7	27
44	r	71/71 (100%)	67 (94%)	4 (6%)	17	43
46	v	789/835 (94%)	770 (98%)	19 (2%)	44	63
47	x	710/715 (99%)	678 (96%)	32 (4%)	23	48
48	SC	77/85 (91%)	74 (96%)	3 (4%)	27	51
49	SE	93/98 (95%)	86 (92%)	7 (8%)	11	34
50	SA	177/182 (97%)	171 (97%)	6 (3%)	32	55
51	SI	115/115 (100%)	111 (96%)	4 (4%)	31	54
52	SL	55/56 (98%)	51 (93%)	4 (7%)	11	35
53	SM	41/47 (87%)	38 (93%)	3 (7%)	11	35
54	SG	105/110 (96%)	98 (93%)	7 (7%)	13	38
55	SB	172/173 (99%)	165 (96%)	7 (4%)	26	50
56	SF	117/117 (100%)	106 (91%)	11 (9%)	7	26
57	SH	127/128 (99%)	119 (94%)	8 (6%)	15	40
58	SK	63/89 (71%)	59 (94%)	4 (6%)	15	40
59	SN	57/64 (89%)	57 (100%)	0	100	100
60	SD	88/98 (90%)	83 (94%)	5 (6%)	17	43
61	SZ	81/96 (84%)	74 (91%)	7 (9%)	8	31
62	Se	81/81 (100%)	74 (91%)	7 (9%)	8	31
63	SP	170/173 (98%)	161 (95%)	9 (5%)	19	44
64	SQ	191/205 (93%)	177 (93%)	14 (7%)	11	35
65	SR	175/175 (100%)	168 (96%)	7 (4%)	27	51

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
66	SS	220/220 (100%)	205 (93%)	15 (7%)	13	38
67	ST	188/195 (96%)	174 (93%)	14 (7%)	11	35
68	SU	163/165 (99%)	155 (95%)	8 (5%)	21	46
69	SV	148/161 (92%)	137 (93%)	11 (7%)	11	35
70	SW	156/157 (99%)	146 (94%)	10 (6%)	14	39
71	SX	126/127 (99%)	123 (98%)	3 (2%)	44	63
72	SY	127/127 (100%)	119 (94%)	8 (6%)	15	40
73	Sa	71/74 (96%)	68 (96%)	3 (4%)	25	49
74	Sb	110/110 (100%)	99 (90%)	11 (10%)	6	24
75	Sc	119/119 (100%)	112 (94%)	7 (6%)	16	41
76	Sd	112/112 (100%)	106 (95%)	6 (5%)	18	44
77	Sf	70/70 (100%)	63 (90%)	7 (10%)	6	24
78	Sg	47/51 (92%)	44 (94%)	3 (6%)	14	39
79	SJ	93/93 (100%)	91 (98%)	2 (2%)	47	65
80	J	186/191 (97%)	181 (97%)	5 (3%)	40	60
81	SO	259/261 (99%)	239 (92%)	20 (8%)	10	34
All	All	10643/10956 (97%)	10110 (95%)	533 (5%)	23	45

All (533) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	S	44	PHE
1	S	69	ARG
1	S	94	PHE
1	S	111	ARG
1	S	151	ARG
1	S	164	ARG
1	S	171	LYS
6	D	24	GLN
6	D	29	LEU
6	D	34	TYR
6	D	50	HIS
6	D	71	LEU
6	D	83	HIS
7	E	3	HIS
7	E	10	ARG

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
7	E	24	SER
7	E	53	MET
7	E	104	THR
7	E	199	PHE
7	E	226	PHE
7	E	246	LEU
7	E	269	GLN
7	E	279	ASN
7	E	293	ASN
7	E	308	MET
7	E	332	ARG
7	E	380	MET
8	F	18	ASN
8	F	50	TYR
8	F	93	MET
8	F	144	LYS
8	F	209	TYR
8	F	255	PHE
8	F	264	SER
8	F	311	HIS
8	F	330	TYR
9	G	17	GLN
9	G	58	LYS
9	G	75	LEU
9	G	104	LEU
9	G	113	LEU
9	G	119	TYR
9	G	131	LEU
9	G	203	HIS
9	G	210	GLU
9	G	238	ASP
9	G	253	PHE
9	G	265	TYR
10	H	14	ASP
10	H	82	ARG
10	H	94	GLU
10	H	143	LYS
10	H	163	PHE
10	H	167	ASN
10	H	175	LYS
11	I	33	ARG
11	I	105	LEU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
11	I	118	LYS
11	I	138	TYR
11	I	140	SER
11	I	164	SER
11	I	176	TYR
11	I	205	PHE
11	I	207	LEU
11	I	208	SER
11	I	223	PHE
11	I	229	PHE
12	K	8	GLN
12	K	78	MET
12	K	117	PHE
12	K	171	ASP
12	K	180	TYR
13	L	8	CYS
13	L	10	ARG
13	L	44	ASP
13	L	62	SER
13	L	71	CYS
13	L	82	ARG
13	L	143	SER
14	M	13	LYS
14	M	49	LYS
14	M	52	TYR
14	M	107	ASP
14	M	109	HIS
14	M	116	TYR
14	M	127	PHE
14	M	158	ASP
14	M	163	PHE
15	N	7	LEU
15	N	85	LEU
15	N	160	GLN
16	O	25	LYS
16	O	65	LEU
16	O	68	LEU
16	O	107	GLU
16	O	121	MET
17	P	6	TYR
17	P	13	LYS
17	P	31	ARG

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
17	P	38	ARG
17	P	46	ASP
17	P	47	LYS
17	P	125	SER
17	P	129	TYR
17	P	137	PRO
17	P	147	ARG
17	P	150	TRP
17	P	175	ASN
18	Q	18[A]	ARG
18	Q	48[A]	PHE
18	Q	57[A]	PHE
18	Q	87[A]	MET
18	Q	100[A]	GLU
18	Q	113[A]	ASP
18	Q	117[A]	ARG
18	Q	168[A]	TYR
18	Q	174[A]	PHE
18	Q	188[A]	SER
18	Q	199[A]	TYR
19	R	10	ASN
19	R	18	ARG
19	R	39	TRP
19	R	87	SER
19	R	118	GLN
20	T	47	ASN
20	T	99	LEU
20	T	119	LEU
20	T	135	LYS
20	T	148	ASP
20	T	165	LYS
21	U	6	GLU
21	U	8	GLN
21	U	41	TYR
21	U	45	LEU
21	U	62	ASN
21	U	88	HIS
21	U	114	HIS
21	U	118	PHE
21	U	136	LYS
21	U	144	LEU
21	U	172	TYR

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
22	V	19	PHE
22	V	85	LEU
22	V	136	ARG
23	W	10	LYS
23	W	15	PHE
23	W	32	SER
23	W	36	TYR
23	W	59	ASP
23	W	83	TYR
24	X	11	PHE
24	X	12	ARG
24	X	74	MET
24	X	80	ARG
24	X	94	TYR
25	Y	1	MET
25	Y	2	LYS
25	Y	34	SER
25	Y	43	ARG
25	Y	57	LYS
26	Z	137	ASN
27	a	11	ASP
27	a	74	TYR
27	a	75	ARG
27	a	83	ASP
27	a	100	HIS
27	a	104	LEU
27	a	108	LYS
28	b	30	ASP
28	b	92	PHE
28	b	94	SER
28	b	107	ARG
28	b	118	PHE
28	b	130	PHE
29	c	16	SER
29	c	28	HIS
29	c	40	HIS
29	c	90	TYR
30	d	17	HIS
31	e	27	TYR
31	e	59	TYR
31	e	61	MET
31	e	74	ASN

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
31	e	91	SER
32	f	81	GLU
32	f	90	PHE
32	f	104	LEU
33	g	4	LEU
33	g	20	HIS
33	g	24	ARG
33	g	27	ARG
33	g	51	SER
33	g	65	PHE
33	g	83	GLU
34	h	7	LEU
34	h	8	TYR
34	h	58	GLU
34	h	86	ARG
34	h	97	SER
35	i	7	PHE
35	i	19	LYS
35	i	49	SER
35	i	55	SER
35	i	66	SER
35	i	87	GLU
35	i	93	PHE
35	i	96	GLU
35	i	107	GLU
36	j	17	LEU
36	j	95	PHE
37	k	11	LEU
37	k	13	LYS
38	l	15	SER
38	l	20	ASN
38	l	22	CYS
38	l	24	ARG
38	l	28	HIS
38	l	34	CYS
38	l	39	TYR
38	l	71	SER
38	l	74	PHE
39	m	38	PHE
40	n	43	ASN
41	o	122	ARG
43	q	6	LYS

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
43	q	18	ARG
43	q	27	GLN
43	q	28	TYR
43	q	44	ASP
43	q	61	LYS
43	q	63	LYS
43	q	90	HIS
44	r	21	SER
44	r	69	TYR
44	r	81	SER
44	r	89	MET
46	v	198	GLU
46	v	257	ARG
46	v	389	TYR
46	v	404	ASP
46	v	406	PHE
46	v	412	ASP
46	v	428	GLU
46	v	472	MET
46	v	483	PHE
46	v	611	ASN
46	v	612	TYR
46	v	627	PHE
46	v	641	SER
46	v	647	PHE
46	v	688	PHE
46	v	702	ASN
46	v	738	HIS
46	v	858	LYS
46	v	892	ARG
47	x	29	ASP
47	x	62	ASP
47	x	90	LYS
47	x	102	LEU
47	x	111	PHE
47	x	218	TRP
47	x	220	PHE
47	x	225	PHE
47	x	241	MET
47	x	247	ASP
47	x	300	LEU
47	x	302	LYS

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
47	x	324	MET
47	x	337	MET
47	x	341	HIS
47	x	397	PHE
47	x	448	CYS
47	x	462	PHE
47	x	521	TYR
47	x	549	HIS
47	x	553	PRO
47	x	619	MET
47	x	639	ASP
47	x	651	LYS
47	x	687	ASN
47	x	717	PHE
47	x	744	TYR
47	x	751	ARG
47	x	785	ARG
47	x	796	MET
47	x	804	LEU
47	x	810	ASP
48	SC	14	TYR
48	SC	63	TYR
48	SC	75	TYR
49	SE	29	SER
49	SE	31	GLU
49	SE	33	PHE
49	SE	56	PHE
49	SE	77	ARG
49	SE	89	MET
49	SE	127	ARG
50	SA	17	PHE
50	SA	18	TYR
50	SA	24	PHE
50	SA	152	PHE
50	SA	165	ASN
50	SA	190	ARG
51	SI	33	TYR
51	SI	48	GLN
51	SI	57	ARG
51	SI	63	ARG
52	SL	19	THR
52	SL	38	ARG

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
52	SL	59	SER
52	SL	65	ARG
53	SM	24	CYS
53	SM	40	ARG
53	SM	46	LYS
54	SG	5	ARG
54	SG	28	PHE
54	SG	56	HIS
54	SG	71	PHE
54	SG	91	LEU
54	SG	100	LEU
54	SG	103	ASP
55	SB	25	LEU
55	SB	92	ARG
55	SB	99	MET
55	SB	106	LYS
55	SB	116	HIS
55	SB	135	ASP
55	SB	219	ARG
56	SF	10	PHE
56	SF	26	LYS
56	SF	38	LEU
56	SF	52	LEU
56	SF	79	TYR
56	SF	83	GLN
56	SF	106	LYS
56	SF	123	ARG
56	SF	129	PHE
56	SF	132	LYS
56	SF	141	SER
57	SH	36	LYS
57	SH	54	LEU
57	SH	78	HIS
57	SH	84	TRP
57	SH	104	ASN
57	SH	114	GLU
57	SH	127	HIS
57	SH	128	PHE
58	SK	42	LEU
58	SK	59	TYR
58	SK	84	GLU
58	SK	85	LYS

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
60	SD	39	ASP
60	SD	84	ASN
60	SD	100	TRP
60	SD	133	LEU
60	SD	140	PHE
61	SZ	27	PHE
61	SZ	46	MET
61	SZ	56	SER
61	SZ	103	ARG
61	SZ	105	LEU
61	SZ	124	ASP
61	SZ	128	LYS
62	Se	5	ARG
62	Se	22	ARG
62	Se	59	TYR
62	Se	69	ASN
62	Se	71	LEU
62	Se	73	TYR
62	Se	95	ARG
63	SP	3	LEU
63	SP	18	LEU
63	SP	69	ASN
63	SP	115	PHE
63	SP	129	ASP
63	SP	150	ASP
63	SP	162	CYS
63	SP	174	TRP
63	SP	204	TYR
64	SQ	38	PHE
64	SQ	59	ASP
64	SQ	83	LYS
64	SQ	86	LEU
64	SQ	92	GLN
64	SQ	100	PHE
64	SQ	108	ASP
64	SQ	111	ARG
64	SQ	113	MET
64	SQ	115	ARG
64	SQ	118	GLN
64	SQ	132	ASP
64	SQ	136	ARG
64	SQ	174	LYS

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
65	SR	35	TRP
65	SR	98	PHE
65	SR	141	ARG
65	SR	162	CYS
65	SR	185	LYS
65	SR	222	TYR
65	SR	224	PHE
66	SS	36	HIS
66	SS	82	TYR
66	SS	98	ASN
66	SS	108	ARG
66	SS	116	ASP
66	SS	182	TYR
66	SS	201	HIS
66	SS	202	ASP
66	SS	205	PHE
66	SS	216	ASN
66	SS	218	PHE
66	SS	223	ASN
66	SS	235	TYR
66	SS	246	LEU
66	SS	255	ARG
67	ST	6	SER
67	ST	7	TYR
67	ST	27	PHE
67	ST	29	ASP
67	ST	43	ASP
67	ST	48	TYR
67	ST	64	LYS
67	ST	65	GLN
67	ST	75	LEU
67	ST	79	LYS
67	ST	87	ARG
67	ST	144	PHE
67	ST	155	ASP
67	ST	156	PHE
68	SU	24	PHE
68	SU	83	LYS
68	SU	126	LEU
68	SU	131	PHE
68	SU	164	TYR
68	SU	167	GLU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
68	SU	169	PHE
68	SU	173	TYR
69	SV	4	SER
69	SV	21	PHE
69	SV	47	ARG
69	SV	64	ASN
69	SV	67	TRP
69	SV	143	TRP
69	SV	160	PHE
69	SV	180	ASP
69	SV	182	TYR
69	SV	189	LEU
69	SV	191	PHE
70	SW	8	TYR
70	SW	12	TYR
70	SW	68	LYS
70	SW	71	PHE
70	SW	90	LYS
70	SW	92	LYS
70	SW	114	TYR
70	SW	121	SER
70	SW	158	PHE
70	SW	184	SER
71	SX	67	ARG
71	SX	121	ASP
71	SX	132	SER
72	SY	3	ARG
72	SY	18	TYR
72	SY	27	LYS
72	SY	64	ARG
72	SY	89	TYR
72	SY	90	TYR
72	SY	102	LEU
72	SY	113	PHE
73	Sa	12	TYR
73	Sa	44	ARG
73	Sa	56	SER
74	Sb	16	ASN
74	Sb	37	PHE
74	Sb	46	TYR
74	Sb	65	LEU
74	Sb	70	ASN

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
74	Sb	79	PHE
74	Sb	99	PHE
74	Sb	101	TYR
74	Sb	111	MET
74	Sb	118	ARG
74	Sb	120	HIS
75	Sc	24	TRP
75	Sc	29	TYR
75	Sc	31	LYS
75	Sc	54	LEU
75	Sc	79	ASN
75	Sc	122	PHE
75	Sc	132	LEU
76	Sd	8	ARG
76	Sd	53	ASP
76	Sd	58	PHE
76	Sd	76	TYR
76	Sd	89	TYR
76	Sd	133	ASN
77	Sf	3	LEU
77	Sf	5	GLN
77	Sf	9	HIS
77	Sf	21	LEU
77	Sf	31	TYR
77	Sf	33	LEU
77	Sf	64	CYS
78	Sg	40	TYR
78	Sg	53	LYS
78	Sg	56	MET
79	SJ	48	HIS
79	SJ	52	LYS
80	J	49	TYR
80	J	84	ARG
80	J	124	ASP
80	J	146	LYS
80	J	233	TRP
81	SO	8	VAL
81	SO	22	SER
81	SO	37	SER
81	SO	40	LYS
81	SO	45	TRP
81	SO	53	LYS

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Mol	Chain	Res	Type
81	SO	64	HIS
81	SO	67	ILE
81	SO	79	TYR
81	SO	87	LYS
81	SO	109	ASP
81	SO	121	MET
81	SO	127	ARG
81	SO	177	MET
81	SO	189	GLU
81	SO	193	ILE
81	SO	229	LYS
81	SO	232	TYR
81	SO	241	PHE
81	SO	299	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (41) such sidechains are listed below:

Mol	Chain	Res	Type
6	D	86	GLN
7	E	173	GLN
8	F	58	HIS
9	G	57	ASN
13	L	100	ASN
16	O	27	GLN
18	Q	50[A]	ASN
19	R	118	GLN
20	T	156	ASN
21	U	65	ASN
22	V	95	HIS
22	V	134	GLN
28	b	127	ASN
29	c	25	HIS
32	f	43	HIS
35	i	18	ASN
35	i	108	GLN
36	j	108	GLN
38	l	28	HIS
38	l	79	GLN
44	r	33	GLN
46	v	121	ASN
46	v	464	ASN
47	x	27	HIS

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Mol	Chain	Res	Type
48	SC	62	GLN
51	SI	129	GLN
55	SB	169	ASN
58	SK	95	HIS
59	SN	123	ASN
65	SR	59	HIS
65	SR	110	HIS
66	SS	157	ASN
67	ST	13	GLN
70	SW	48	GLN
72	SY	49	GLN
74	Sb	66	ASN
75	Sc	22	ASN
76	Sd	63	GLN
81	SO	174	ASN
81	SO	200	ASN
81	SO	308	ASN

### 5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
2	2	1768/1799 (98%)	444 (25%)	33 (1%)
3	A	3187/3394 (93%)	515 (16%)	10 (0%)
4	B	120/121 (99%)	10 (8%)	1 (0%)
45	s	74/75 (98%)	14 (18%)	0
45	t	74/75 (98%)	31 (41%)	0
5	C	157/158 (99%)	34 (21%)	1 (0%)
All	All	5380/5622 (95%)	1048 (19%)	45 (0%)

All (1048) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
2	2	2	A
2	2	4	C
2	2	25	C
2	2	26	A
2	2	34	G
2	2	42	G
2	2	43	A
2	2	45	U
2	2	47	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	2	56	U
2	2	57	G
2	2	61	A
2	2	62	A
2	2	65	A
2	2	68	A
2	2	69	G
2	2	73	U
2	2	74	U
2	2	76	A
2	2	77	U
2	2	78	A
2	2	80	A
2	2	81	G
2	2	104	A
2	2	114	C
2	2	116	U
2	2	121	U
2	2	126	A
2	2	127	G
2	2	129	U
2	2	130	C
2	2	131	C
2	2	132	U
2	2	134	U
2	2	135	A
2	2	138	A
2	2	140	A
2	2	141	U
2	2	142	G
2	2	145	A
2	2	153	G
2	2	158	U
2	2	161	U
2	2	168	A
2	2	171	A
2	2	172	C
2	2	176	C
2	2	178	U
2	2	184	C
2	2	185	U
2	2	186	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	2	188	A
2	2	189	C
2	2	191	C
2	2	193	U
2	2	194	U
2	2	195	G
2	2	196	G
2	2	216	U
2	2	217	A
2	2	218	A
2	2	223	U
2	2	224	C
2	2	225	A
2	2	226	A
2	2	227	U
2	2	230	C
2	2	233	C
2	2	234	G
2	2	238	U
2	2	240	U
2	2	241	U
2	2	249	U
2	2	250	C
2	2	260	U
2	2	261	U
2	2	265	A
2	2	270	C
2	2	272	U
2	2	274	G
2	2	276	C
2	2	278	U
2	2	279	G
2	2	280	U
2	2	281	G
2	2	287	G
2	2	299	A
2	2	302	U
2	2	313	U
2	2	314	C
2	2	316	A
2	2	321	C
2	2	322	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	2	323	A
2	2	330	G
2	2	333	A
2	2	337	G
2	2	338	C
2	2	352	A
2	2	353	A
2	2	359	A
2	2	360	A
2	2	361	C
2	2	369	A
2	2	370	A
2	2	388	G
2	2	390	G
2	2	400	A
2	2	401	A
2	2	402	C
2	2	404	G
2	2	415	C
2	2	416	A
2	2	417	A
2	2	418	G
2	2	419	G
2	2	423	G
2	2	424	C
2	2	425	A
2	2	426	G
2	2	435	C
2	2	439	U
2	2	444	C
2	2	446	A
2	2	447	U
2	2	448	C
2	2	482	U
2	2	483	A
2	2	485	A
2	2	487	G
2	2	492	A
2	2	493	U
2	2	494	U
2	2	496	G
2	2	498	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	2	499	U
2	2	500	C
2	2	506	A
2	2	510	G
2	2	517	U
2	2	518	A
2	2	519	C
2	2	525	A
2	2	534	A
2	2	538	A
2	2	540	G
2	2	541	A
2	2	542	A
2	2	543	C
2	2	554	C
2	2	555	A
2	2	556	A
2	2	557	G
2	2	558	U
2	2	559	C
2	2	565	C
2	2	568	G
2	2	575	C
2	2	578	U
2	2	579	A
2	2	594	A
2	2	595	G
2	2	609	U
2	2	610	G
2	2	617	U
2	2	619	A
2	2	620	A
2	2	622	A
2	2	623	A
2	2	624	G
2	2	638	U
2	2	639	U
2	2	640	U
2	2	641	G
2	2	643	G
2	2	645	C
2	2	653	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	2	654	C
2	2	655	G
2	2	677	G
2	2	678	A
2	2	680	U
2	2	681	U
2	2	684	A
2	2	687	G
2	2	688	G
2	2	693	U
2	2	694	U
2	2	696	C
2	2	698	U
2	2	700	C
2	2	703	G
2	2	704	C
2	2	705	U
2	2	706	A
2	2	707	A
2	2	708	C
2	2	709	C
2	2	710	U
2	2	711	U
2	2	712	G
2	2	728	U
2	2	730	G
2	2	732	G
2	2	733	A
2	2	736	C
2	2	738	G
2	2	741	C
2	2	742	U
2	2	743	U
2	2	745	U
2	2	756	A
2	2	765	G
2	2	766	U
2	2	767	U
2	2	774	A
2	2	775	G
2	2	778	G
2	2	781	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	2	782	U
2	2	783	G
2	2	787	G
2	2	789	A
2	2	811	A
2	2	812	A
2	2	813	U
2	2	814	A
2	2	816	G
2	2	819	G
2	2	820	U
2	2	821	U
2	2	823	G
2	2	833	U
2	2	836	U
2	2	837	G
2	2	840	U
2	2	841	U
2	2	846	G
2	2	857	U
2	2	861	U
2	2	863	A
2	2	864	U
2	2	873	U
2	2	886	U
2	2	898	A
2	2	899	G
2	2	901	G
2	2	902	G
2	2	912	U
2	2	913	G
2	2	929	A
2	2	933	A
2	2	934	C
2	2	935	U
2	2	937	C
2	2	942	G
2	2	945	U
2	2	964	U
2	2	966	A
2	2	969	C
2	2	970	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	2	972	G
2	2	989	U
2	2	992	A
2	2	1004	U
2	2	1024	U
2	2	1028	C
2	2	1029	U
2	2	1032	G
2	2	1039	A
2	2	1052	U
2	2	1053	G
2	2	1055	U
2	2	1058	U
2	2	1060	U
2	2	1061	A
2	2	1062	A
2	2	1063	U
2	2	1066	C
2	2	1074	G
2	2	1076	A
2	2	1080	U
2	2	1081	A
2	2	1082	C
2	2	1092	A
2	2	1096	C
2	2	1098	U
2	2	1100	G
2	2	1113	A
2	2	1138	A
2	2	1143	A
2	2	1150	G
2	2	1158	C
2	2	1160	A
2	2	1164	G
2	2	1167	G
2	2	1170	G
2	2	1185	U
2	2	1186	U
2	2	1194	A
2	2	1196	A
2	2	1199	G
2	2	1200	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	2	1217	A
2	2	1218	G
2	2	1227	A
2	2	1228	G
2	2	1229	G
2	2	1241	G
2	2	1243	G
2	2	1244	A
2	2	1245	G
2	2	1246	C
2	2	1252	C
2	2	1256	A
2	2	1257	U
2	2	1265	G
2	2	1274	C
2	2	1275	A
2	2	1276	U
2	2	1285	U
2	2	1307	U
2	2	1314	U
2	2	1321	A
2	2	1322	A
2	2	1325	A
2	2	1337	A
2	2	1341	A
2	2	1344	A
2	2	1345	A
2	2	1346	A
2	2	1348	A
2	2	1349	G
2	2	1360	A
2	2	1361	U
2	2	1363	U
2	2	1364	G
2	2	1367	G
2	2	1370	U
2	2	1371	A
2	2	1372	U
2	2	1373	C
2	2	1378	U
2	2	1381	U
2	2	1382	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	2	1383	G
2	2	1390	U
2	2	1391	A
2	2	1398	U
2	2	1399	C
2	2	1400	A
2	2	1406	A
2	2	1407	U
2	2	1408	G
2	2	1409	G
2	2	1414	U
2	2	1415	U
2	2	1427	A
2	2	1428	G
2	2	1431	C
2	2	1432	U
2	2	1433	G
2	2	1436	A
2	2	1445	G
2	2	1446	A
2	2	1459	C
2	2	1460	A
2	2	1468	U
2	2	1469	A
2	2	1472	C
2	2	1474	G
2	2	1479	A
2	2	1491	U
2	2	1493	A
2	2	1496	U
2	2	1516	A
2	2	1517	U
2	2	1518	C
2	2	1521	G
2	2	1523	G
2	2	1524	A
2	2	1528	U
2	2	1530	C
2	2	1531	G
2	2	1537	C
2	2	1540	G
2	2	1542	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	2	1543	A
2	2	1545	A
2	2	1556	A
2	2	1557	U
2	2	1558	U
2	2	1559	A
2	2	1570	A
2	2	1572	G
2	2	1574	G
2	2	1575	G
2	2	1583	A
2	2	1585	U
2	2	1595	U
2	2	1601	G
2	2	1611	A
2	2	1614	A
2	2	1616	G
2	2	1619	C
2	2	1631	A
2	2	1633	A
2	2	1634	C
2	2	1637	C
2	2	1656	U
2	2	1657	U
2	2	1658	G
2	2	1659	A
2	2	1682	U
2	2	1688	U
2	2	1689	A
2	2	1693	A
2	2	1701	A
2	2	1706	C
2	2	1708	U
2	2	1709	C
2	2	1712	A
2	2	1715	G
2	2	1717	G
2	2	1719	A
2	2	1745	G
2	2	1747	G
2	2	1748	G
2	2	1755	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
2	2	1757	G
2	2	1762	A
2	2	1767	G
2	2	1769	U
2	2	1770	U
2	2	1780	G
2	2	1782	A
2	2	1783	C
2	2	1792	G
2	2	1793	G
2	2	1794	A
2	2	1795	U
2	2	1796	C
2	2	1797	A
2	2	1799	U
3	A	14	U
3	A	16	A
3	A	26	A
3	A	30	G
3	A	40	A
3	A	43	A
3	A	49	A
3	A	59	G
3	A	60	A
3	A	65	A
3	A	66	A
3	A	77	A
3	A	92	G
3	A	99	A
3	A	109	A
3	A	110	G
3	A	111	C
3	A	116	A
3	A	117	U
3	A	118	U
3	A	122	A
3	A	135	C
3	A	136	G
3	A	148	G
3	A	156	G
3	A	157	A
3	A	172	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	A	173	G
3	A	190	U
3	A	191	U
3	A	219	A
3	A	231	G
3	A	240	U
3	A	241	G
3	A	243	G
3	A	245	U
3	A	247	C
3	A	252	U
3	A	263	C
3	A	269	G
3	A	286	U
3	A	295	A
3	A	298	U
3	A	305	U
3	A	315	C
3	A	329	U
3	A	341	G
3	A	346	C
3	A	361	A
3	A	376	G
3	A	398	A
3	A	401	U
3	A	402	A
3	A	403	C
3	A	420	G
3	A	421	G
3	A	422	A
3	A	490	A
3	A	491	C
3	A	492	U
3	A	518	G
3	A	521	A
3	A	523	A
3	A	533	A
3	A	555	U
3	A	557	A
3	A	558	U
3	A	559	A
3	A	589	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	A	601	U
3	A	602	A
3	A	611	A
3	A	636	C
3	A	646	A
3	A	649	A
3	A	667	C
3	A	677	A
3	A	678	G
3	A	681	U
3	A	683	U
3	A	690	A
3	A	691	A
3	A	692	A
3	A	705	A
3	A	712	G
3	A	719	U
3	A	758	C
3	A	761	A
3	A	766	U
3	A	767	U
3	A	780	A
3	A	781	G
3	A	785	G
3	A	786	A
3	A	799	G
3	A	817	A
3	A	830	A
3	A	836	A
3	A	848	A
3	A	849	C
3	A	857	G
3	A	861	C
3	A	874	U
3	A	879	U
3	A	880	G
3	A	896	A
3	A	907	G
3	A	914	A
3	A	916	G
3	A	917	A
3	A	921	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	A	937	G
3	A	944	C
3	A	959	C
3	A	960	U
3	A	977	C
3	A	979	U
3	A	980	A
3	A	984	G
3	A	985	U
3	A	1016	C
3	A	1018	G
3	A	1019	G
3	A	1020	G
3	A	1021	G
3	A	1022	U
3	A	1037	C
3	A	1047	A
3	A	1063	G
3	A	1064	A
3	A	1072	G
3	A	1081	U
3	A	1087	G
3	A	1093	A
3	A	1096	U
3	A	1097	G
3	A	1098	A
3	A	1103	A
3	A	1104	G
3	A	1117	G
3	A	1131	G
3	A	1143	A
3	A	1153	A
3	A	1159	A
3	A	1178	G
3	A	1180	A
3	A	1181	U
3	A	1182	A
3	A	1189	C
3	A	1191	U
3	A	1193	A
3	A	1196	C
3	A	1201	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	A	1209	G
3	A	1222	G
3	A	1223	A
3	A	1232	C
3	A	1235	U
3	A	1236	G
3	A	1245	A
3	A	1246	G
3	A	1248	C
3	A	1253	U
3	A	1257	C
3	A	1258	U
3	A	1262	G
3	A	1263	A
3	A	1265	U
3	A	1266	G
3	A	1267	U
3	A	1272	C
3	A	1302	A
3	A	1307	G
3	A	1308	A
3	A	1317	A
3	A	1331	U
3	A	1348	U
3	A	1349	G
3	A	1352	A
3	A	1357	G
3	A	1386	A
3	A	1392	G
3	A	1399	A
3	A	1400	G
3	A	1417	G
3	A	1418	A
3	A	1425	U
3	A	1434	G
3	A	1437	C
3	A	1446	A
3	A	1483	G
3	A	1487	G
3	A	1495	U
3	A	1496	C
3	A	1504	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	A	1507	G
3	A	1508	C
3	A	1556	C
3	A	1557	A
3	A	1560	G
3	A	1562	C
3	A	1563	C
3	A	1564	U
3	A	1566	A
3	A	1567	U
3	A	1569	U
3	A	1570	U
3	A	1571	A
3	A	1573	G
3	A	1576	G
3	A	1578	C
3	A	1579	C
3	A	1581	C
3	A	1582	C
3	A	1583	A
3	A	1589	A
3	A	1593	A
3	A	1594	A
3	A	1605	A
3	A	1621	A
3	A	1630	U
3	A	1643	A
3	A	1645	U
3	A	1657	C
3	A	1694	U
3	A	1713	G
3	A	1724	U
3	A	1740	U
3	A	1741	A
3	A	1750	A
3	A	1751	G
3	A	1759	C
3	A	1762	C
3	A	1763	U
3	A	1767	C
3	A	1769	G
3	A	1773	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	A	1775	G
3	A	1796	G
3	A	1797	A
3	A	1808	G
3	A	1812	G
3	A	1815	U
3	A	1816	A
3	A	1820	U
3	A	1821	U
3	A	1840	U
3	A	1842	A
3	A	1866	C
3	A	1878	G
3	A	1879	A
3	A	1880	U
3	A	1906	G
3	A	1948	G
3	A	2095	G
3	A	2101	C
3	A	2102	U
3	A	2111	G
3	A	2112	U
3	A	2122	G
3	A	2131	A
3	A	2158	A
3	A	2167	A
3	A	2168	A
3	A	2169	G
3	A	2170	U
3	A	2188	A
3	A	2194	G
3	A	2205	U
3	A	2222	A
3	A	2223	A
3	A	2244	A
3	A	2249	G
3	A	2251	G
3	A	2252	A
3	A	2253	G
3	A	2254	U
3	A	2255	A
3	A	2256	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	A	2257	C
3	A	2258	U
3	A	2259	A
3	A	2261	G
3	A	2262	A
3	A	2268	U
3	A	2270	A
3	A	2273	G
3	A	2274	U
3	A	2281	A
3	A	2287	C
3	A	2306	C
3	A	2307	G
3	A	2310	U
3	A	2315	G
3	A	2319	U
3	A	2320	A
3	A	2335	G
3	A	2336	U
3	A	2372	A
3	A	2373	A
3	A	2374	C
3	A	2375	G
3	A	2376	G
3	A	2388	U
3	A	2393	G
3	A	2394	G
3	A	2397	A
3	A	2402	A
3	A	2403	G
3	A	2404	A
3	A	2411	U
3	A	2418	G
3	A	2436	U
3	A	2441	A
3	A	2442	G
3	A	2443	A
3	A	2449	A
3	A	2452	G
3	A	2453	U
3	A	2454	G
3	A	2455	U

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	A	2456	A
3	A	2458	A
3	A	2459	A
3	A	2461	A
3	A	2462	A
3	A	2463	G
3	A	2465	G
3	A	2468	A
3	A	2469	G
3	A	2470	C
3	A	2471	U
3	A	2474	G
3	A	2477	G
3	A	2480	A
3	A	2484	A
3	A	2487	U
3	A	2488	A
3	A	2489	C
3	A	2491	A
3	A	2492	C
3	A	2493	U
3	A	2494	A
3	A	2495	C
3	A	2498	U
3	A	2499	U
3	A	2501	U
3	A	2503	G
3	A	2505	U
3	A	2506	U
3	A	2509	U
3	A	2514	U
3	A	2515	A
3	A	2522	G
3	A	2523	A
3	A	2526	C
3	A	2533	G
3	A	2534	G
3	A	2535	A
3	A	2536	A
3	A	2537	U
3	A	2538	U
3	A	2539	C

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	A	2540	A
3	A	2541	U
3	A	2542	U
3	A	2546	C
3	A	2547	A
3	A	2549	G
3	A	2552	C
3	A	2555	G
3	A	2560	C
3	A	2561	A
3	A	2569	A
3	A	2570	U
3	A	2571	U
3	A	2573	G
3	A	2585	G
3	A	2593	A
3	A	2600	C
3	A	2606	G
3	A	2607	G
3	A	2614	G
3	A	2617	U
3	A	2648	G
3	A	2652	U
3	A	2656	A
3	A	2657	A
3	A	2672	G
3	A	2674	A
3	A	2676	A
3	A	2678	A
3	A	2681	U
3	A	2689	A
3	A	2691	A
3	A	2696	A
3	A	2704	A
3	A	2712	U
3	A	2713	U
3	A	2728	G
3	A	2729	U
3	A	2737	C
3	A	2746	A
3	A	2749	G
3	A	2753	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	A	2755	C
3	A	2772	C
3	A	2773	C
3	A	2777	G
3	A	2778	G
3	A	2779	A
3	A	2795	U
3	A	2796	G
3	A	2799	A
3	A	2800	G
3	A	2801	A
3	A	2804	A
3	A	2808	A
3	A	2810	C
3	A	2817	A
3	A	2828	G
3	A	2838	A
3	A	2843	U
3	A	2844	C
3	A	2845	A
3	A	2847	A
3	A	2860	U
3	A	2867	C
3	A	2871	G
3	A	2872	A
3	A	2887	A
3	A	2889	C
3	A	2899	C
3	A	2911	A
3	A	2934	A
3	A	2935	U
3	A	2936	A
3	A	2941	A
3	A	2951	G
3	A	2971	A
3	A	2972	G
3	A	2979	U
3	A	2983	C
3	A	2990	G
3	A	2997	G
3	A	3003	G
3	A	3005	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	A	3012	A
3	A	3021	A
3	A	3039	C
3	A	3056	U
3	A	3057	U
3	A	3059	G
3	A	3074	G
3	A	3078	U
3	A	3079	U
3	A	3092	C
3	A	3093	C
3	A	3101	G
3	A	3113	A
3	A	3115	C
3	A	3122	A
3	A	3130	A
3	A	3131	U
3	A	3142	A
3	A	3143	C
3	A	3153	U
3	A	3154	C
3	A	3156	U
3	A	3157	U
3	A	3168	A
3	A	3170	A
3	A	3172	A
3	A	3173	G
3	A	3176	G
3	A	3179	U
3	A	3181	C
3	A	3186	A
3	A	3187	A
3	A	3198	U
3	A	3207	U
3	A	3217	C
3	A	3218	A
3	A	3219	G
3	A	3227	A
3	A	3228	C
3	A	3229	G
3	A	3235	C
3	A	3244	A

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
3	A	3247	G
3	A	3260	G
3	A	3268	A
3	A	3270	U
3	A	3271	G
3	A	3273	A
3	A	3276	G
3	A	3277	U
3	A	3279	A
3	A	3281	U
3	A	3304	U
3	A	3313	U
3	A	3316	A
3	A	3319	U
3	A	3334	U
3	A	3335	A
3	A	3341	U
3	A	3350	C
3	A	3352	U
3	A	3353	G
3	A	3368	U
3	A	3369	G
3	A	3375	A
3	A	3378	C
3	A	3382	U
3	A	3390	G
4	B	7	G
4	B	22	A
4	B	29	C
4	B	53	U
4	B	54	U
4	B	64	A
4	B	65	G
4	B	76	A
4	B	102	A
4	B	112	G
5	C	16	G
5	C	23	U
5	C	34	U
5	C	35	C
5	C	39	G
5	C	46	G

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
5	C	51	G
5	C	59	A
5	C	62	C
5	C	63	G
5	C	71	A
5	C	80	A
5	C	81	U
5	C	82	U
5	C	83	C
5	C	84	C
5	C	86	U
5	C	87	G
5	C	90	U
5	C	95	G
5	C	102	U
5	C	104	A
5	C	105	A
5	C	106	C
5	C	111	A
5	C	112	U
5	C	113	U
5	C	116	G
5	C	125	U
5	C	126	A
5	C	127	U
5	C	148	G
5	C	152	G
5	C	157	U
45	s	16	U
45	s	19	G
45	s	20	A
45	s	21	A
45	s	46	G
45	s	47	U
45	s	48	C
45	s	59	A
45	s	61	C
45	s	63	G
45	s	64	A
45	s	74	C
45	s	75	C
45	s	76	A

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Mol	Chain	Res	Type
45	t	2	G
45	t	3	C
45	t	7	G
45	t	8	U
45	t	9	G
45	t	10	A
45	t	11	C
45	t	12	G
45	t	13	C
45	t	14	A
45	t	16	U
45	t	18	G
45	t	19	G
45	t	21	A
45	t	29	G
45	t	31	G
45	t	33	U
45	t	35	A
45	t	45	U
45	t	47	U
45	t	48	C
45	t	54	A
45	t	59	A
45	t	60	A
45	t	63	G
45	t	64	A
45	t	69	C
45	t	73	A
45	t	74	C
45	t	75	C
45	t	76	A

All (45) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
2	2	68	A
2	2	77	U
2	2	139	C
2	2	215	A
2	2	237	C
2	2	322	G
2	2	352	A

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Mol	Chain	Res	Type
2	2	387	A
2	2	400	A
2	2	541	A
2	2	555	A
2	2	609	U
2	2	639	U
2	2	705	U
2	2	711	U
2	2	819	G
2	2	912	U
2	2	928	U
2	2	1023	A
2	2	1226	A
2	2	1245	G
2	2	1256	A
2	2	1273	G
2	2	1274	C
2	2	1344	A
2	2	1382	A
2	2	1430	U
2	2	1471	A
2	2	1557	U
2	2	1584	G
2	2	1633	A
2	2	1636	C
2	2	1657	U
3	A	916	G
3	A	1820	U
3	A	2193	U
3	A	2255	A
3	A	2267	C
3	A	2469	G
3	A	2504	U
3	A	2505	U
3	A	3004	C
3	A	3121	U
4	B	52	G
5	C	85	G

#### 5.4 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

## 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

There are no ligands in this entry.

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

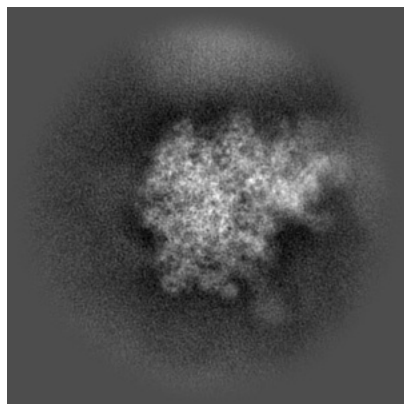
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-38666. These allow visual inspection of the internal detail of the map and identification of artifacts.

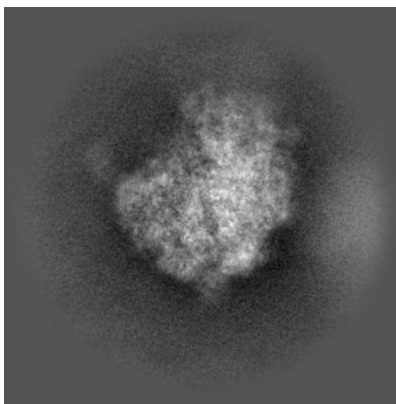
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

### 6.1 Orthogonal projections [i](#)

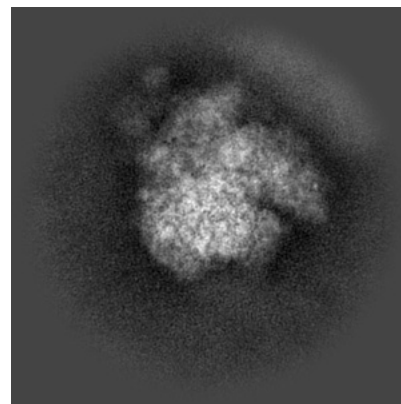
#### 6.1.1 Primary map



X

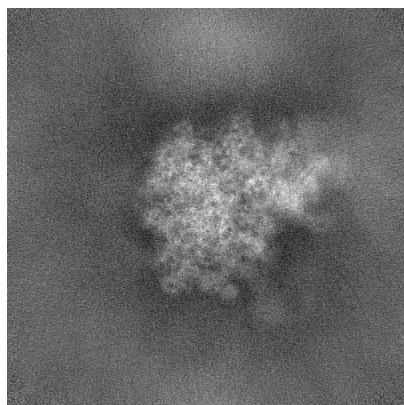


Y

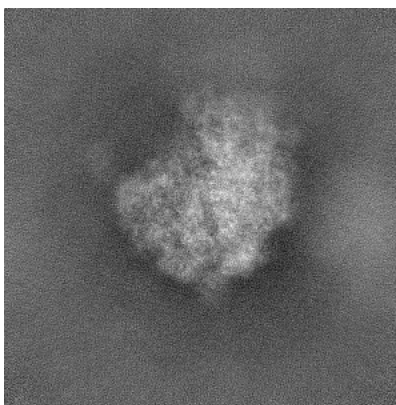


Z

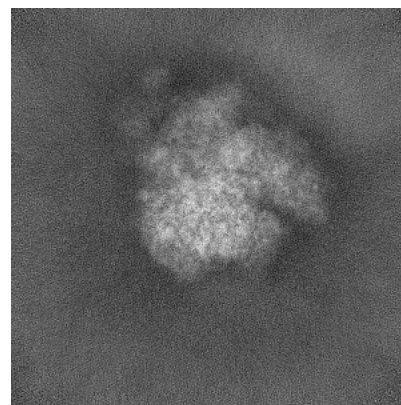
#### 6.1.2 Raw map



X



Y

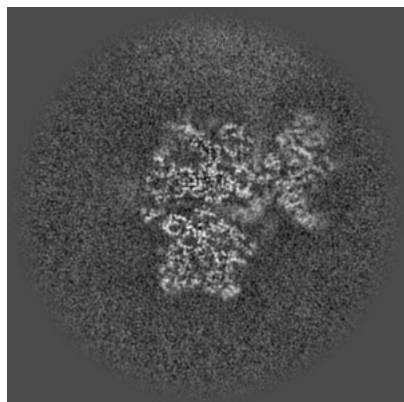


Z

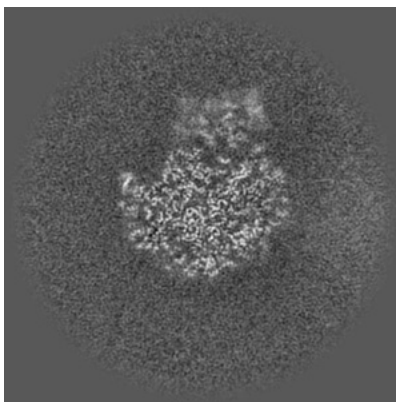
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

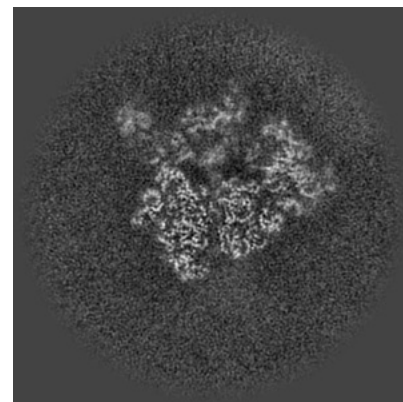
### 6.2.1 Primary map



X Index: 200

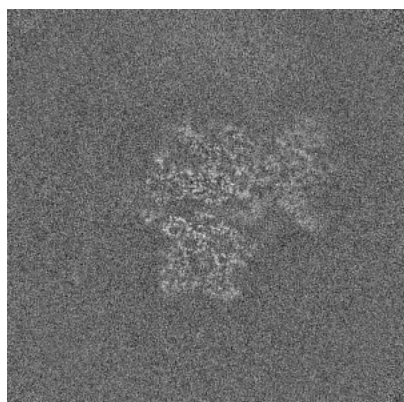


Y Index: 200

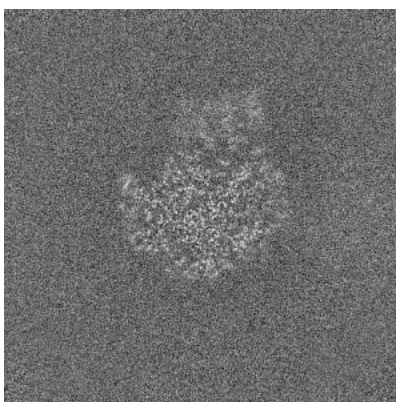


Z Index: 200

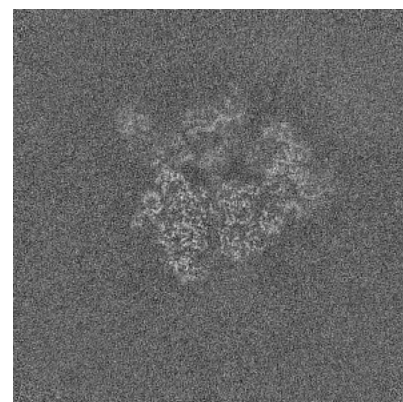
### 6.2.2 Raw map



X Index: 200



Y Index: 200

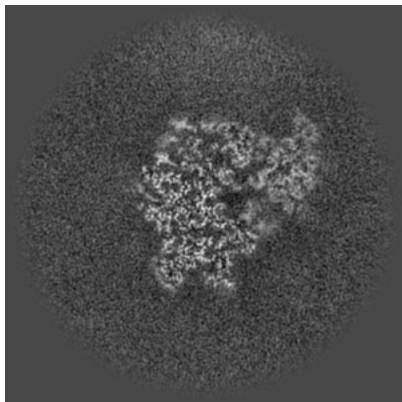


Z Index: 200

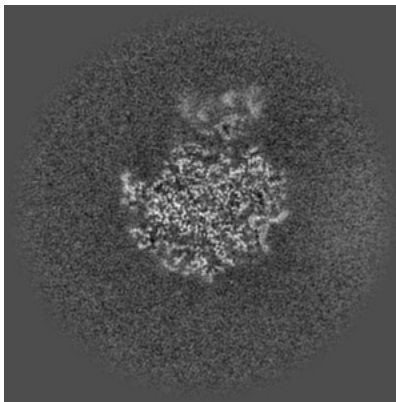
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

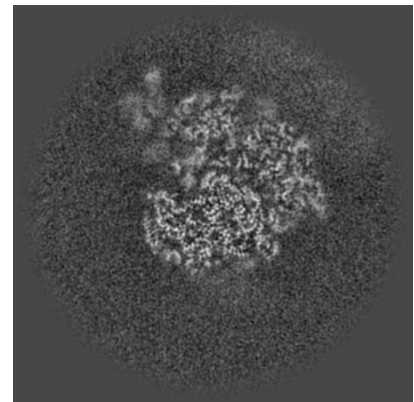
### 6.3.1 Primary map



X Index: 191

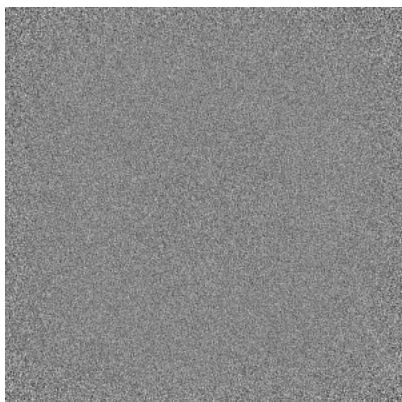


Y Index: 197

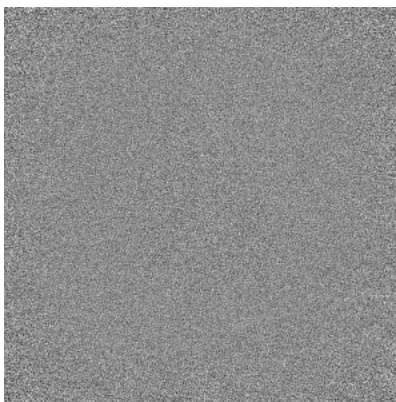


Z Index: 222

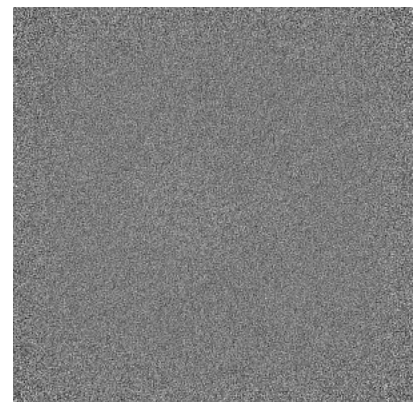
### 6.3.2 Raw map



X Index: 0



Y Index: 0

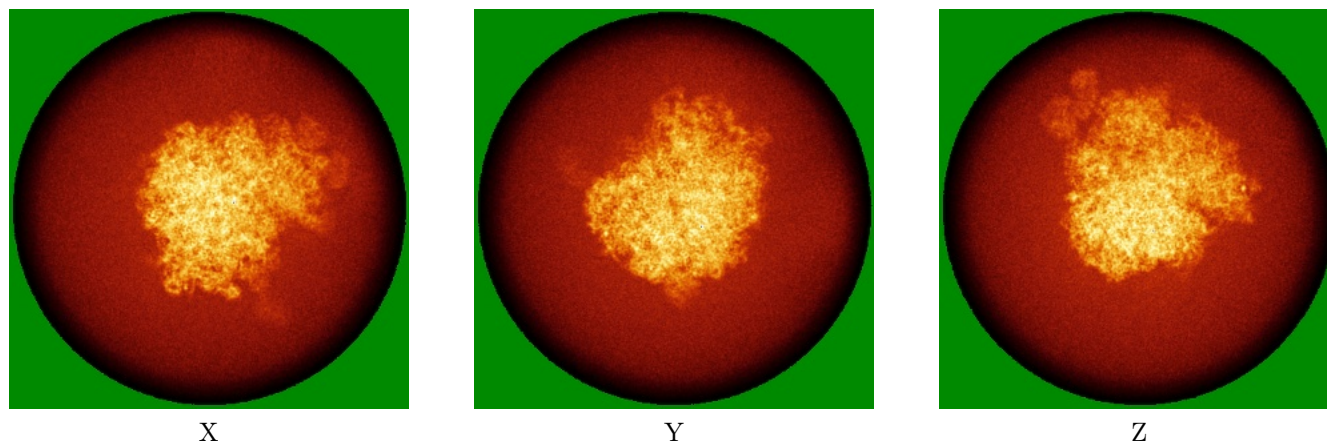


Z Index: 0

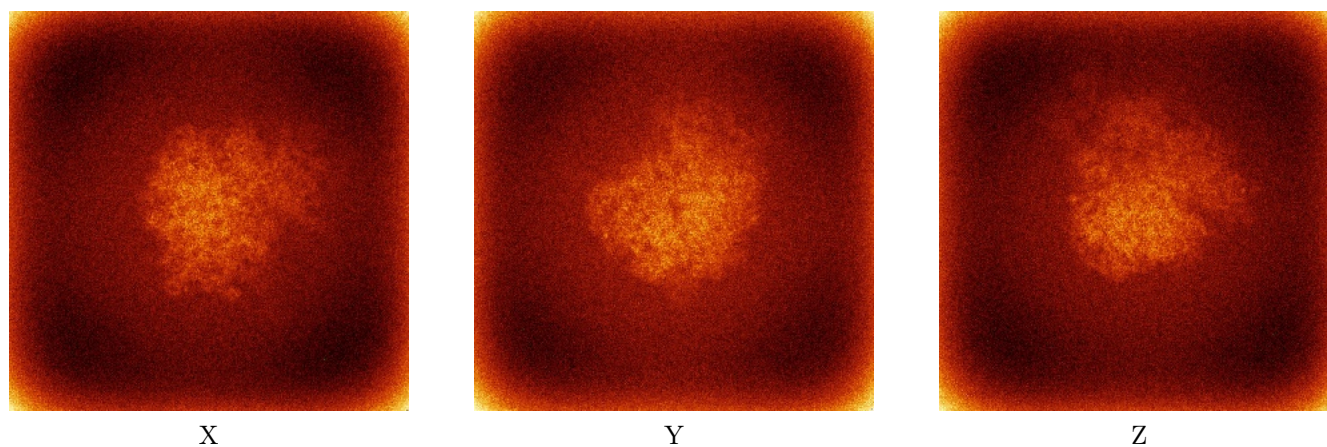
The images above show the largest variance slices of the map in three orthogonal directions.

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

### 6.4.1 Primary map



### 6.4.2 Raw map

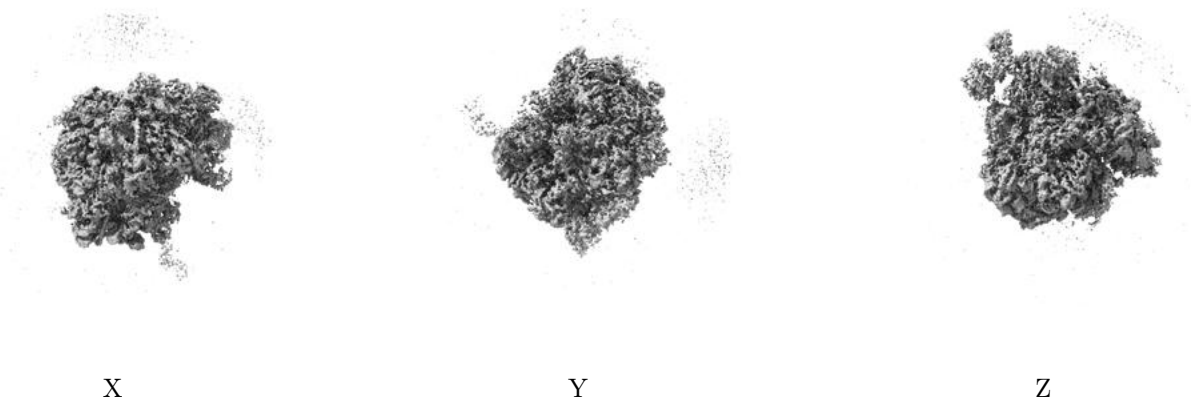


The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.



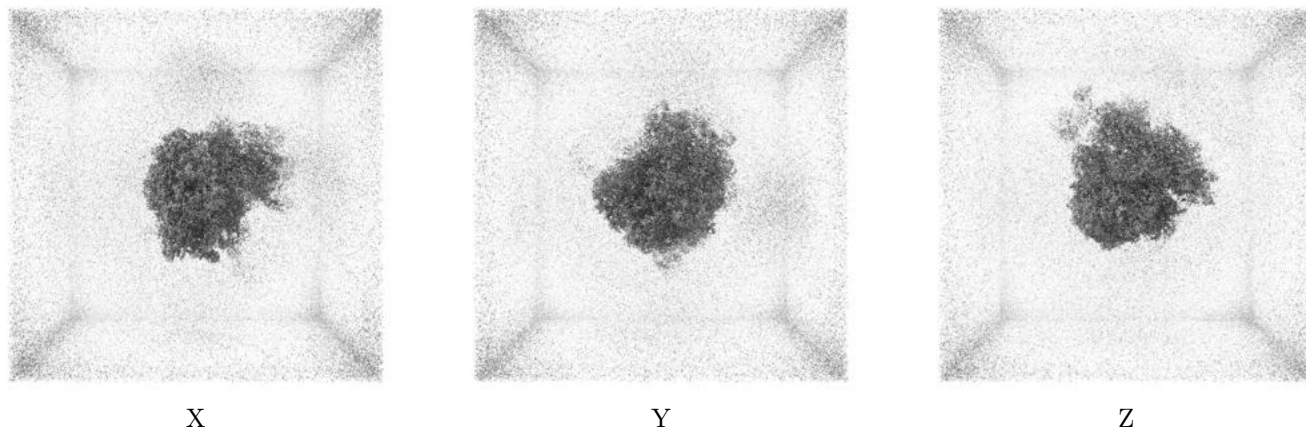
## 6.5 Orthogonal surface views [i](#)

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.306. 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



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.

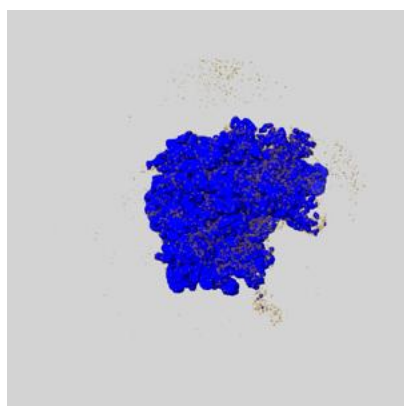
## 6.6 Mask visualisation [i](#)

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

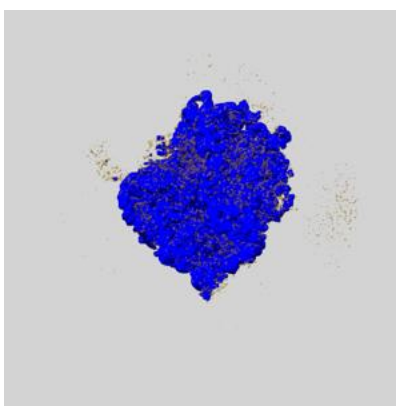
A mask typically either:

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

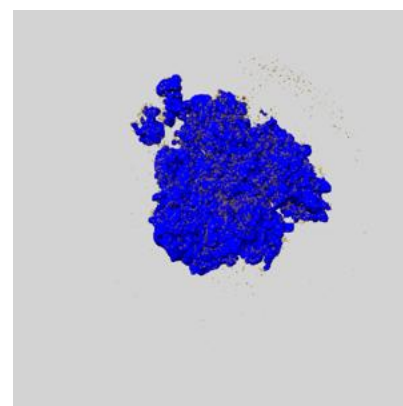
### 6.6.1 emd\_38666\_msk\_1.map [i](#)



X



Y

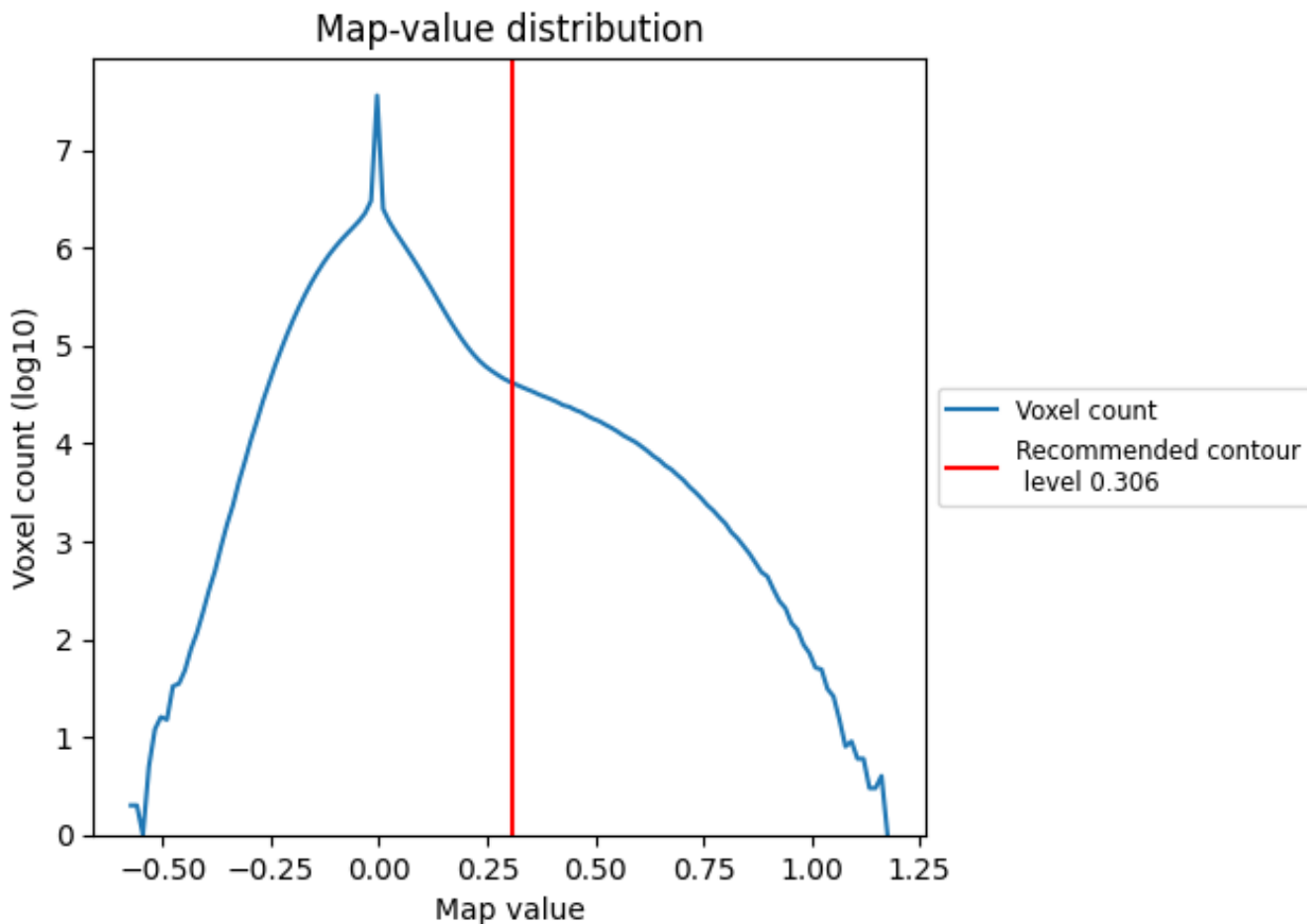


Z

## 7 Map analysis [i](#)

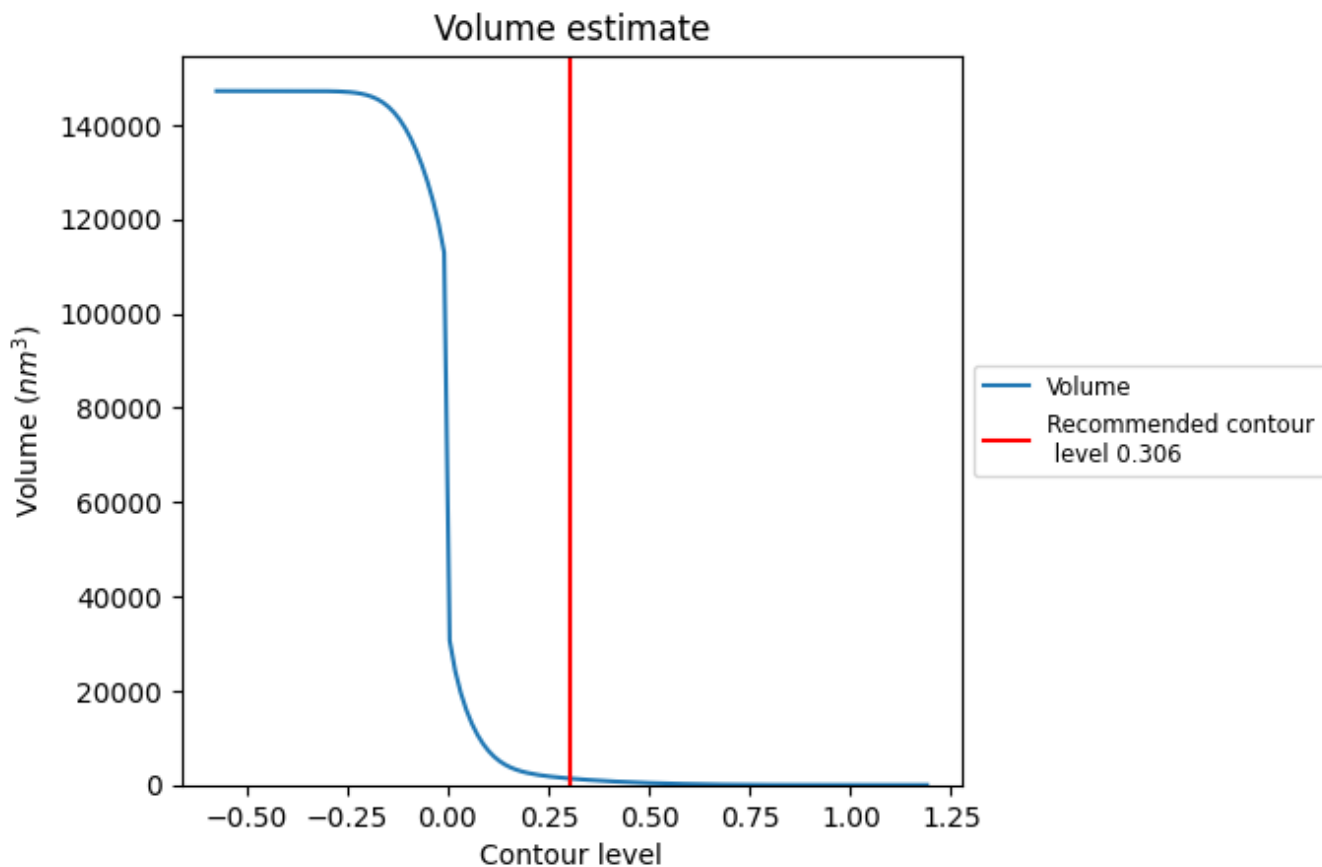
This section contains the results of statistical analysis of the map.

### 7.1 Map-value distribution [i](#)



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

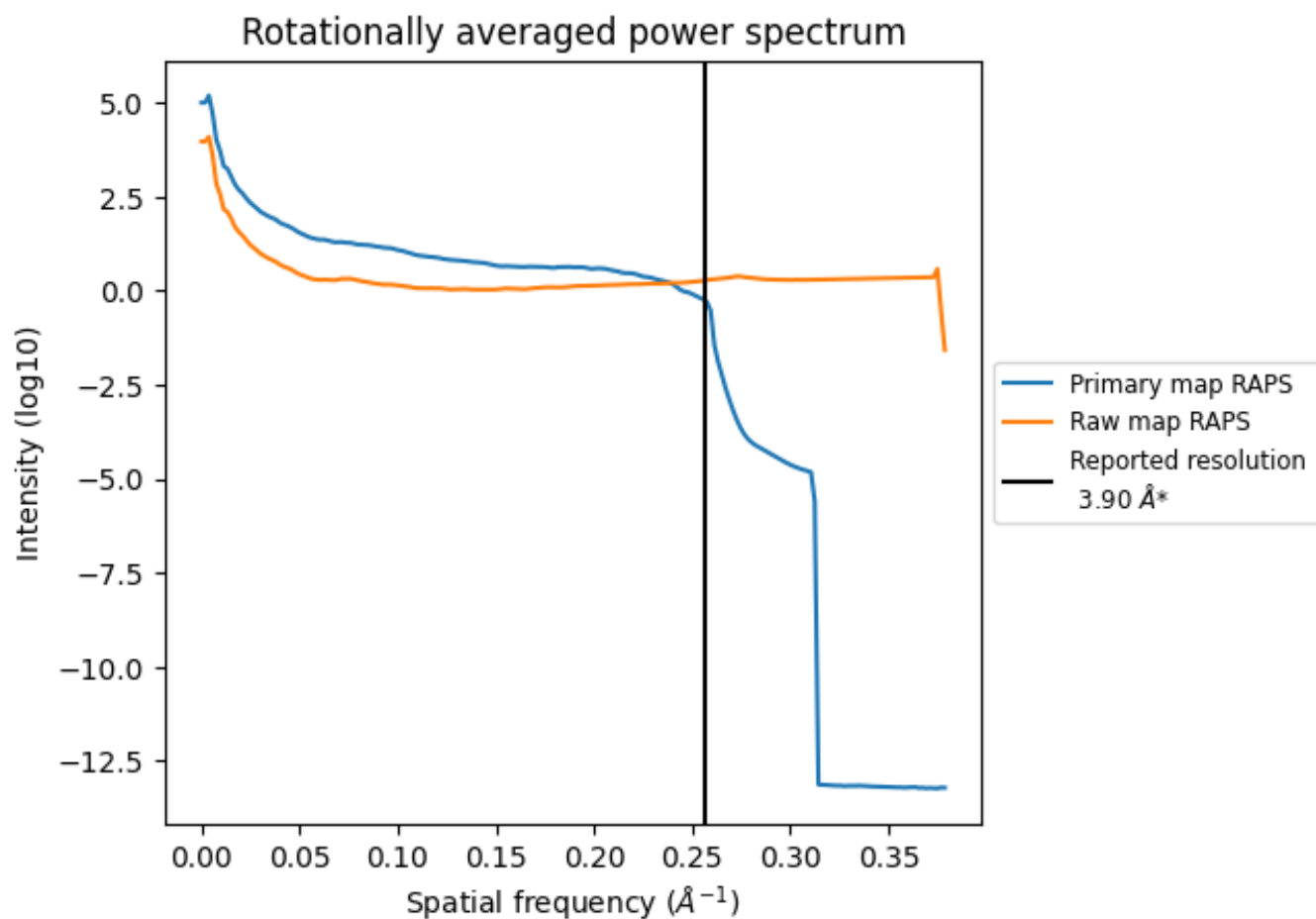
## 7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 1354 nm<sup>3</sup>; this corresponds to an approximate mass of 1223 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

### 7.3 Rotationally averaged power spectrum [i](#)

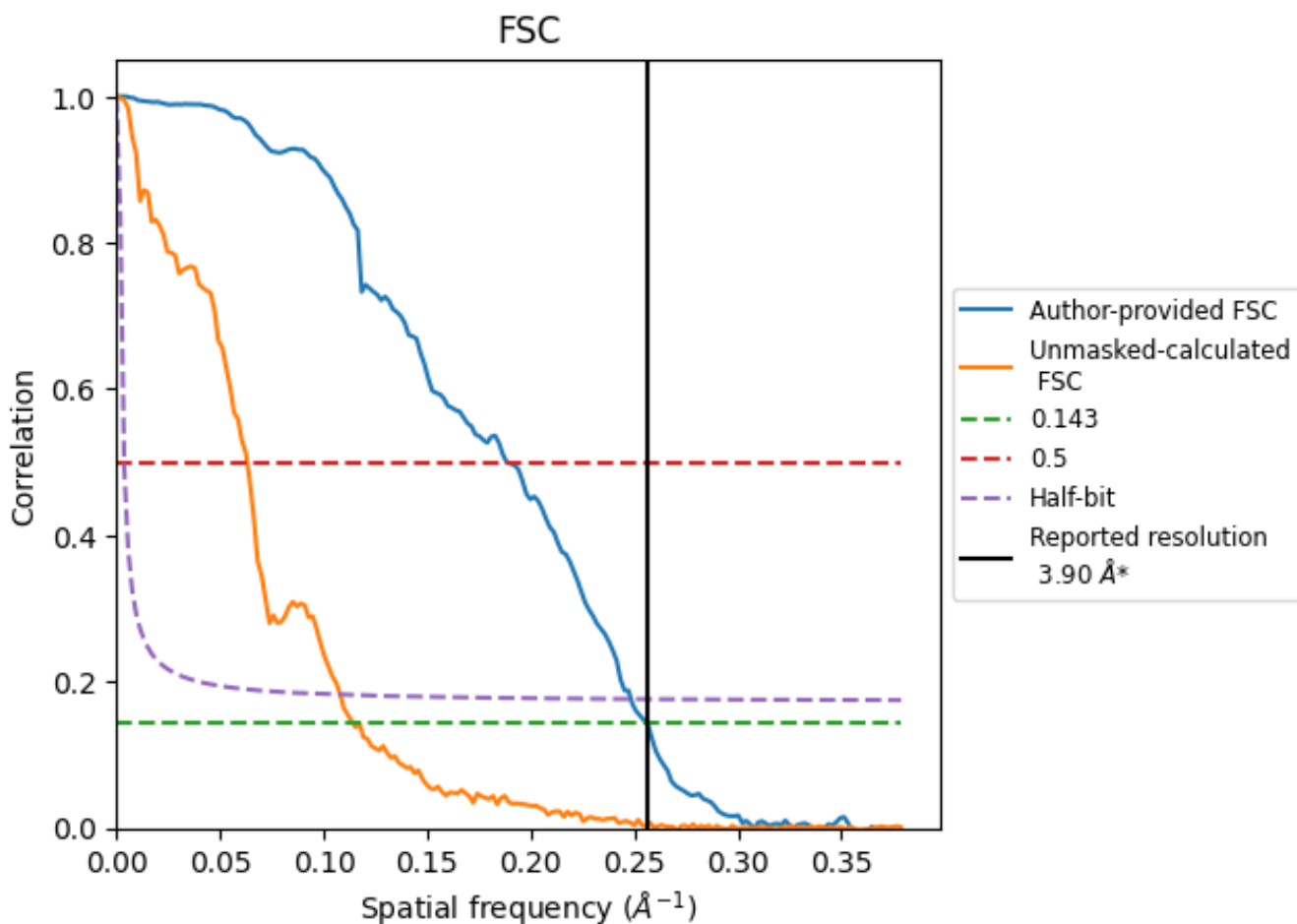


\*Reported resolution corresponds to spatial frequency of 0.256 Å<sup>-1</sup>

## 8 Fourier-Shell correlation [i](#)

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

### 8.1 FSC [i](#)



\*Reported resolution corresponds to spatial frequency of 0.256 Å<sup>-1</sup>

## 8.2 Resolution estimates [i](#)

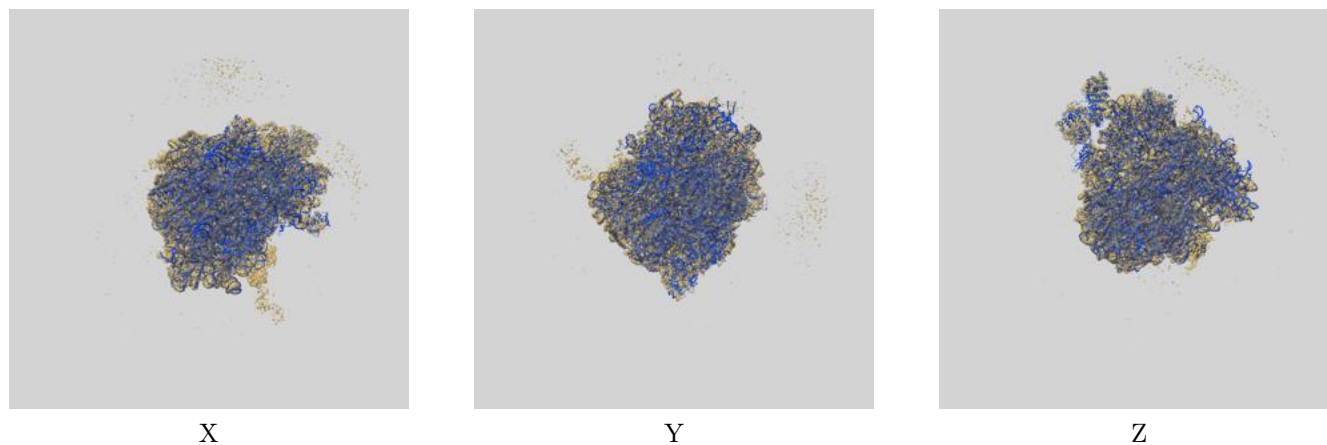
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.90	-	-
Author-provided FSC curve	3.91	5.31	4.03
Unmasked-calculated*	8.75	15.85	9.26

\*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 8.75 differs from the reported value 3.9 by more than 10 %

## 9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-38666 and PDB model 8YLD. Per-residue inclusion information can be found in section 3 on page 18.

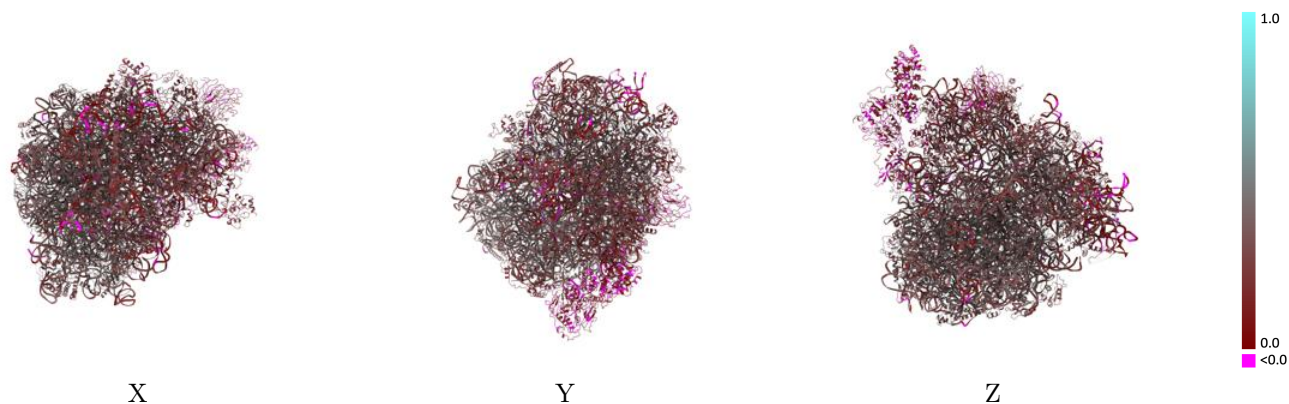
### 9.1 Map-model overlay [i](#)



The images above show the 3D surface view of the map at the recommended contour level 0.306 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

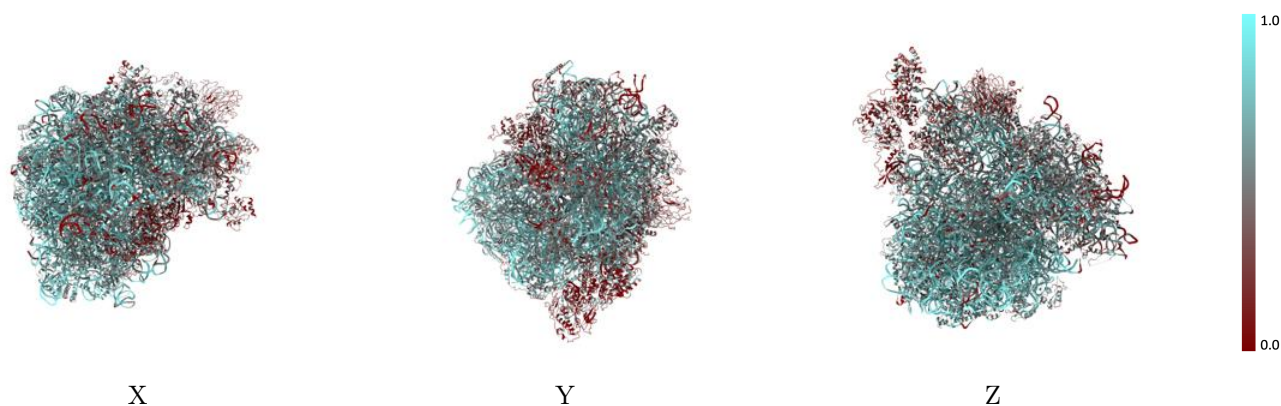


## 9.2 Q-score mapped to coordinate model [i](#)



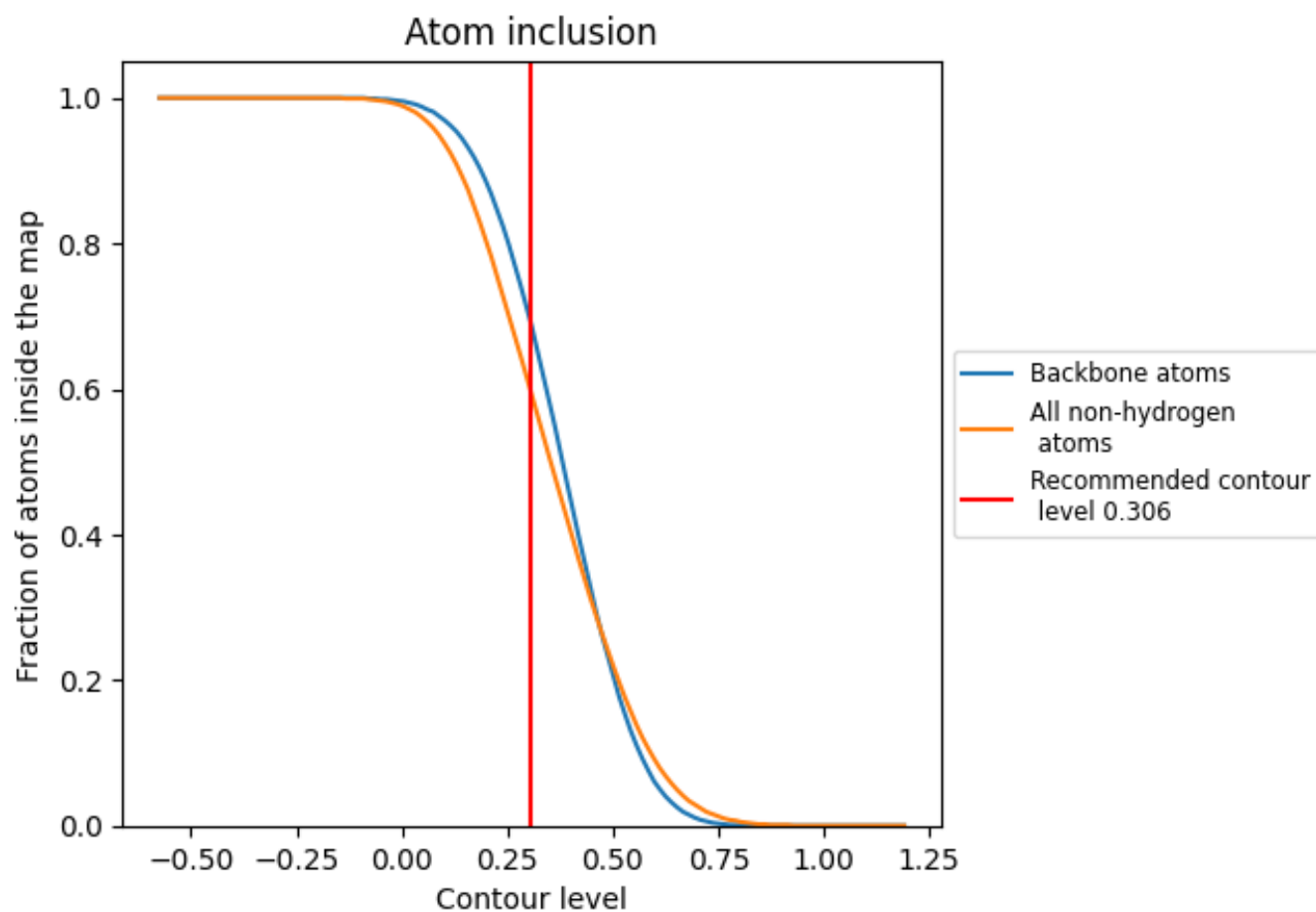
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

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



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.306).

## 9.4 Atom inclusion [i](#)



At the recommended contour level, 69% of all backbone atoms, 60% 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 (0.306) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.5960	0.3110
2	0.6750	0.2780
A	0.7840	0.3450
B	0.8310	0.3370
C	0.8050	0.3590
D	0.5010	0.3920
E	0.5460	0.3810
F	0.5710	0.3820
G	0.5150	0.2860
H	0.5410	0.3440
I	0.5660	0.3610
J	0.5590	0.3350
K	0.5510	0.3570
L	0.5080	0.3630
M	0.4640	0.2850
N	0.5610	0.3630
O	0.5880	0.3510
P	0.5230	0.3880
Q	0.5680	0.3650
R	0.5340	0.3690
S	0.5430	0.3880
SA	0.3370	0.2890
SB	0.3010	0.2640
SC	0.3430	0.2340
SD	0.1560	0.2120
SE	0.3300	0.2520
SF	0.3230	0.2480
SG	0.3900	0.2790
SH	0.3250	0.2540
SI	0.3930	0.2550
SJ	0.3540	0.2570
SK	0.2080	0.1630
SL	0.2370	0.2760
SM	0.4580	0.2770
SN	0.2610	0.1980















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Chain	Atom inclusion	Q-score
SO	0.1970	0.1290
SP	0.4320	0.2900
SQ	0.4700	0.3150
SR	0.4460	0.3340
SS	0.3750	0.2880
ST	0.3830	0.2580
SU	0.4200	0.2590
SV	0.4160	0.3140
SW	0.4060	0.2860
SX	0.4010	0.3350
SY	0.4600	0.3240
SZ	0.4910	0.3420
Sa	0.4400	0.3040
Sb	0.4580	0.3460
Sc	0.3570	0.3350
Sd	0.4140	0.2660
Se	0.4460	0.2900
Sf	0.4510	0.3220
Sg	0.3280	0.2730
T	0.5490	0.3590
U	0.5520	0.3840
V	0.5120	0.3860
W	0.4910	0.3310
X	0.4650	0.3710
Y	0.4830	0.3110
Z	0.5500	0.3820
a	0.5400	0.3610
b	0.5810	0.3610
c	0.5630	0.3840
d	0.4890	0.3580
e	0.5160	0.3510
f	0.5110	0.3740
g	0.5430	0.3980
h	0.5640	0.4050
i	0.4930	0.3740
j	0.5670	0.3460
k	0.5570	0.3520
l	0.5740	0.4020
m	0.5040	0.3460
n	0.5300	0.3910
o	0.5130	0.3740
p	0.4380	0.3600

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Chain	Atom inclusion	Q-score
q	 0.4740	 0.3670
r	 0.4950	 0.3570
s	 0.4350	 0.1520
t	 0.7080	 0.2410
v	 0.1860	 0.1090
x	 0.1510	 0.2310