



## wwPDB EM Validation Summary Report ⓘ

Jun 25, 2025 – 08:09 PM JST

PDB ID : 8XU8 / pdb\_00008xu8  
EMDB ID : EMD-38660  
Title : State 2c(S2c) of yeast 80S ribosome bound to compact eEF2 and 2 tRNAs during peptidyl transferation  
Authors : Cheng, J.; Wu, C.L.; Li, J.X.; Zhang, X.Z.  
Deposited on : 2024-01-12  
Resolution : 3.40 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](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 : **FAILED**  
MolProbity : 4-5-2 with Phenix2.0rc1  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
MapQ : **FAILED**  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.44

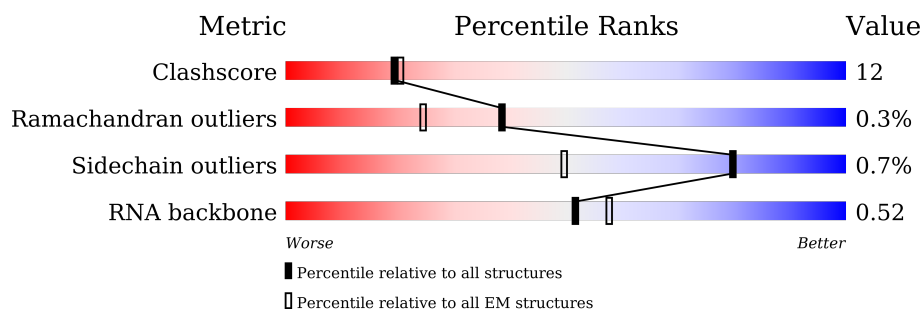
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*ELECTRON MICROSCOPY*

The reported resolution of this entry is 3.40 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.













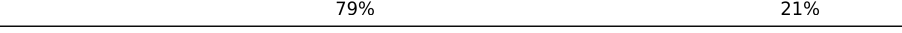
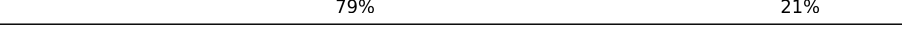
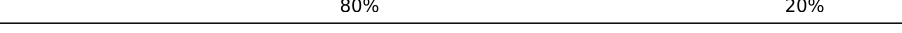


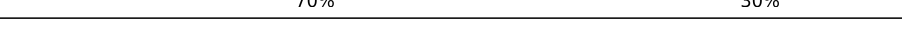









Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415
RNA backbone	6643	2191

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  $\leq 5\%$ .

Mol	Chain	Length	Quality of chain
1	2	1799	38% 47% 13% .
2	A	3394	47% 42% 6% 6%
3	B	121	50% 45% 6%
4	C	158	48% 47% 5%
5	D	251	68% 32%
6	E	386	75% 25%
7	F	361	76% 23%
8	G	294	79% 21%













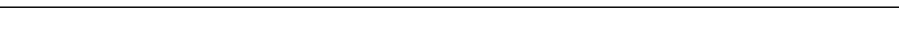

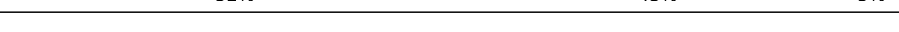

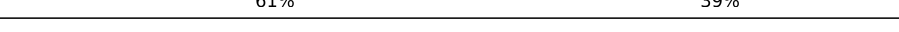








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Mol	Chain	Length	Quality of chain
9	H	175	 73%22%5%
10	I	222	 72%28%
11	J	233	 74%26%
12	K	191	 70%29%
13	L	218	 67%33%
14	M	169	 70%30%
15	N	193	 80%20%
16	O	136	 75%24%
17	P	203	 70%30%
18	Q	197	 71%29%
19	R	183	 79%21%
20	S	185	 79%21%
21	T	188	 80%20%
22	U	171	 75%25%
23	V	159	 69%31%
24	W	100	 70%30%
25	X	136	 74%26%
26	Y	126	 84%16%
27	Z	121	 79%21%
28	a	125	 80%19%
29	b	135	 79%21%
30	c	148	 72%28%
31	d	58	 84%16%
32	e	96	 69%30%
33	f	109	 69%31%












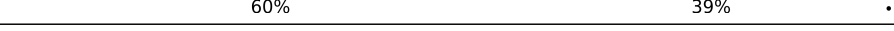

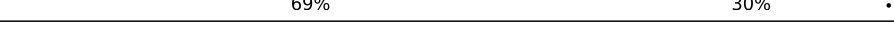







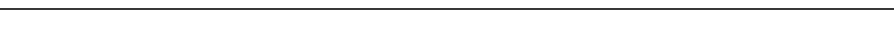

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Mol	Chain	Length	Quality of chain
34	g	127	 76% 23% .
35	h	106	 69% 30% .
36	i	112	 75% 25%
37	j	119	 71% 29%
38	k	99	 79% 21%
39	l	81	 52% 37% 7% .
40	m	77	 69% 31%
41	n	50	 70% 30%
42	o	52	 65% 35%
43	p	25	 72% 28%
44	q	103	 82% 18%
45	r	91	 69% 31%
46	s	75	 41% 52% 7%
46	t	75	 52% 43% 5%
47	x	842	 68% 31%
48	SD	121	 61% 39%
49	SZ	127	 71% 29%
50	Se	94	 72% 27% .
51	SC	92	 49% 49% .
52	SE	117	 65% 34% .
53	SA	222	 66% 34%
54	SI	143	 59% 41%
55	SJ	100	 63% 36% .
56	SL	63	 75% 25%
57	SM	53	 62% 38%

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Mol	Chain	Length	Quality of chain
58	SB	206	 64% 36%
59	SF	141	 60% 38% .
60	SH	145	 59% 41%
61	SO	312	 46% 50% ..
62	SN	73	 74% 26%
63	SG	121	 59% 40% .
64	SP	206	 62% 38%
65	SQ	232	 65% 32% ..
66	SR	216	 71% 28% .
67	SS	258	 62% 37% .
68	ST	228	 72% 27% .
69	SU	184	 60% 39% .
70	SV	198	 65% 30% 6%
71	SW	184	 69% 30% .
72	SX	142	 79% 20% .
73	SY	150	 65% 35%
74	Sa	87	 74% 25% .
75	Sb	129	 67% 32% .
76	Sc	144	 69% 29% ..
77	Sd	134	 78% 22%
78	Sf	81	 62% 38%
79	Sg	60	 78% 22%
80	SK	108	 68% 28% 5%

## 2 Entry composition

There are 80 unique types of molecules in this entry. The entry contains 209284 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 RNA chain called 18S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	2	1767	Total	C	N	O	P	0	0
			37653	16834	6668	12384	1767		

- Molecule 2 is a RNA chain called 25S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	A	3189	Total	C	N	O	P	0	0
			68216	30470	12302	22255	3189		

- Molecule 3 is a RNA chain called 5S rRNA.

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

- Molecule 4 is a RNA chain called 5.8S rRNA.

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

- Molecule 5 is a protein called Large ribosomal subunit protein uL2A.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	D	251	Total	C	N	O	S	0	0
			1899	1182	385	331	1		

- Molecule 6 is a protein called Large ribosomal subunit protein uL3.

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

- Molecule 7 is a protein called Large ribosomal subunit protein uL4A.

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

- Molecule 8 is a protein called Large ribosomal subunit protein uL18.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	G	294	Total	C	N	O	S	0	0
			2351	1484	410	455	2		

- Molecule 9 is a protein called Large ribosomal subunit protein eL6B.

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

- Molecule 10 is a protein called Large ribosomal subunit protein uL30A.

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

- Molecule 11 is a protein called Large ribosomal subunit protein eL8A.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	J	233	Total	C	N	O	S	0	0
			1804	1151	323	327	3		

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

Mol	Chain	Residues	Atoms					AltConf	Trace
12	K	191	Total	C	N	O	S	0	0
			1508	957	274	273	4		

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

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

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

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

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

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

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

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

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

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

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

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

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

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

- Molecule 20 is a protein called Large ribosomal subunit protein eL18A.

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

- Molecule 21 is a protein called Large ribosomal subunit protein eL19A.



Mol	Chain	Residues	Atoms				AltConf	Trace
21	T	188	Total	C	N	O	0	0
			1515	932	323	260		

- Molecule 22 is a protein called Large ribosomal subunit protein eL20A.

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

- Molecule 23 is a protein called Large ribosomal subunit protein eL21A.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	V	159	Total	C	N	O	S	0	0
			1272	802	245	221	4		

- Molecule 24 is a protein called Large ribosomal subunit protein eL22A.

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

- Molecule 25 is a protein called Large ribosomal subunit protein uL14A.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	X	136	Total	C	N	O	S	0	0
			1003	628	189	179	7		

- Molecule 26 is a protein called Large ribosomal subunit protein eL24A.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	Y	126	Total	C	N	O	S	0	0
			836	525	165	145	1		

- Molecule 27 is a protein called Large ribosomal subunit protein uL23.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	Z	121	Total	C	N	O	S	0	0
			964	620	169	173	2		

- Molecule 28 is a protein called Large ribosomal subunit protein uL24A.

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

- Molecule 29 is a protein called Large ribosomal subunit protein eL27A.

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

- Molecule 30 is a protein called Large ribosomal subunit protein uL15.

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

- Molecule 31 is a protein called Large ribosomal subunit protein eL29.

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

- Molecule 32 is a protein called Large ribosomal subunit protein eL30.

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

- Molecule 33 is a protein called Large ribosomal subunit protein eL31A.

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

- Molecule 34 is a protein called Large ribosomal subunit protein eL32.

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

- Molecule 35 is a protein called Large ribosomal subunit protein eL33A.

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

- Molecule 36 is a protein called Large ribosomal subunit protein eL34A.

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

- Molecule 37 is a protein called Large ribosomal subunit protein uL29A.

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

- Molecule 38 is a protein called Large ribosomal subunit protein eL36A.

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

- Molecule 39 is a protein called Large ribosomal subunit protein eL37A.

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

- Molecule 40 is a protein called Large ribosomal subunit protein eL38.

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

- Molecule 41 is a protein called Large ribosomal subunit protein eL39.

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

- Molecule 42 is a protein called Large ribosomal subunit protein eL40A.

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

- Molecule 43 is a protein called Large ribosomal subunit protein eL41A.

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

- Molecule 44 is a protein called Large ribosomal subunit protein eL42A.

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

- Molecule 45 is a protein called Large ribosomal subunit protein eL43A.

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

- Molecule 46 is a RNA chain called tRNA.

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

- Molecule 47 is a protein called Elongation factor 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	x	842	Total	C	N	O	S	0	0
			6559	4166	1124	1238	31		

- Molecule 48 is a protein called Small ribosomal subunit protein eS12.

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

- Molecule 49 is a protein called Small ribosomal subunit protein uS11B.

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

- Molecule 50 is a protein called Small ribosomal subunit protein eS26A.

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

- Molecule 51 is a protein called Small ribosomal subunit protein eS10A.

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

- Molecule 52 is a protein called Small ribosomal subunit protein uS19.

Mol	Chain	Residues	Atoms					AltConf	Trace
52	SE	117	Total	C	N	O	S	0	0
			916	583	171	155	7		

- Molecule 53 is a protein called Small ribosomal subunit protein uS3.

Mol	Chain	Residues	Atoms					AltConf	Trace
53	SA	222	Total	C	N	O	S	0	0
			1729	1098	312	313	6		

- Molecule 54 is a protein called Small ribosomal subunit protein eS19A.

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

- Molecule 55 is a protein called Small ribosomal subunit protein uS10.

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

- Molecule 56 is a protein called Small ribosomal subunit protein eS28A.

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

- Molecule 57 is a protein called Small ribosomal subunit protein uS14A.

Mol	Chain	Residues	Atoms					AltConf	Trace
57	SM	53	Total	C	N	O	S	0	0
			442	274	92	72	4		

- Molecule 58 is a protein called Small ribosomal subunit protein uS7.

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

- Molecule 59 is a protein called Small ribosomal subunit protein uS9A.

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

- Molecule 60 is a protein called Small ribosomal subunit protein uS13A.

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

- Molecule 61 is a protein called Small ribosomal subunit protein RACK1.

Mol	Chain	Residues	Atoms					AltConf	Trace
61	SO	304	Total	C	N	O	S	0	0
			2326	1477	401	440	8		

- Molecule 62 is a protein called Small ribosomal subunit protein eS31.

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

- Molecule 63 is a protein called Small ribosomal subunit protein eS17A.

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

- Molecule 64 is a protein called Small ribosomal subunit protein uS2A.

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

- Molecule 65 is a protein called Small ribosomal subunit protein eS1A.

Mol	Chain	Residues	Atoms					AltConf	Trace
65	SQ	226	Total	C	N	O	S	0	0
			1798	1139	330	325	4		

- Molecule 66 is a protein called Small ribosomal subunit protein uS5.

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

- Molecule 67 is a protein called Small ribosomal subunit protein eS4A.

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

- Molecule 68 is a protein called Small ribosomal subunit protein eS6A.

Mol	Chain	Residues	Atoms					AltConf	Trace
68	ST	228	Total	C	N	O	S	0	0
			1815	1138	351	323	3		

- Molecule 69 is a protein called Small ribosomal subunit protein eS7A.

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

- Molecule 70 is a protein called Small ribosomal subunit protein eS8A.

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

- Molecule 71 is a protein called Small ribosomal subunit protein uS4A.

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

- Molecule 72 is a protein called Small ribosomal subunit protein uS17A.

Mol	Chain	Residues	Atoms					AltConf	Trace
72	SX	142	Total	C	N	O	S	0	0
			1142	733	217	189	3		

- Molecule 73 is a protein called Small ribosomal subunit protein uS15.

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

- Molecule 74 is a protein called Small ribosomal subunit protein eS21A.

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

- Molecule 75 is a protein called Small ribosomal subunit protein uS8A.

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

- Molecule 76 is a protein called Small ribosomal subunit protein uS12A.

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

- Molecule 77 is a protein called Small ribosomal subunit protein eS24A.



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

- Molecule 78 is a protein called Small ribosomal subunit protein eS27A.

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

- Molecule 79 is a protein called Small ribosomal subunit protein eS30A.

Mol	Chain	Residues	Atoms					AltConf	Trace
79	Sg	60	Total	C	N	O	S	0	0
			472	298	97	76	1		

- Molecule 80 is a protein called Small ribosomal subunit protein eS25A.

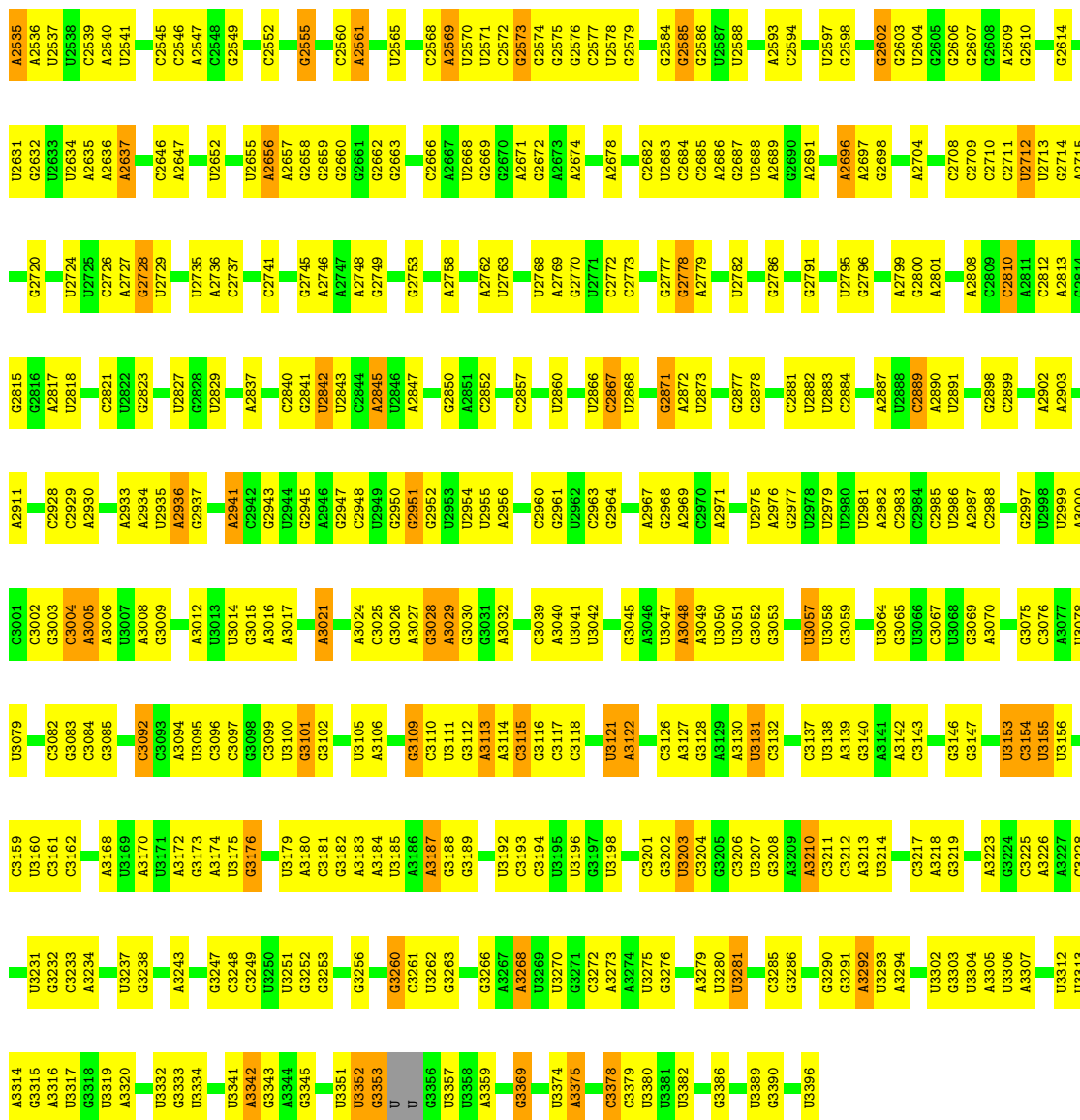
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80	SK	103	Total	C	N	O	S	0	0
			810	514	151	143	2		



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G1786	U1708	A1633	G1485	G1409	A1337	G1244	C1176	G1096	A1025	A944	G872	A806
C1787	C1709	C1634	A1486	A1410	G1338	G1245	G1177	U1097	A1026	U947	U873	A809
G1788	A1712	A1635	A1487	A1411	G1339	U1246	G1178	U1098	A1027	G948	G874	G810
C1789	A1712	C1636	G1488	G1412	U1340	U1249	C1179	U1099	C1028	C949	G875	A811
A1790	G1715	U1637	A1493	G1413	A1341	U1250	G1180	U1099	U1029	C950	G876	U813
G1791	C1716	C1638	C1494	U1414	U1341	C1252	U1181	G1108	A1030	A951	G877	A814
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C1796	A1721	G1572	G1499	G1419	A1348	U1287	U1185	G1113	A1036	A955	U886	A884
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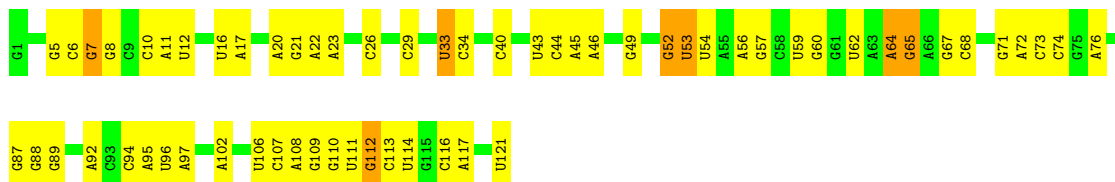
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C1201	U1039	A1040	A970	A895	G809	G727	G652	U583	U	U431	A348	U248	G160	U78	C8
A1203	U1128	A1040	G971	A896	A810	G728	G653	G493	G493	G432	U249	U250	G161	G80	U9
G1207	A1129	A1046	G974	U899	G813	G733	G654	A585	G495	A433	C350	G251	C162	C81	
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C1132	U1048	A1048	U976	G900	G815	A735	A657	U587	A501	G	A352	C259	A165	U87	A20
G1209	A1049	C1049	C977	U903	A816	A736	G658	G588	U502	A	A357	C260	C166	A88	G22
U1210	G1134	A1054	G978	U904	A817	G737	G659	A589	C503	A	U359	U262	G170	G91	G21
C1219	A1135	A1054	A980	U905	A817	A738	G663	G590	A504	U	U360	C263	G173	G92	A23
U1220	C1136	A1067	U981	U906	U821	G742	U664	G591	U508	G	U361			G93	A26
A1221	U1138	G822	C982	G907	G822	G743	A685	U594	U508	U	G267		U177	G94	
G1222	G1139	G823	U985	G908	G824	C743	U671	G595	A516	U	A268			G94	C29
U1230	C1140	A1061	U986	G908	A744	A745	A672	C596	A517	U	G269		U182	G96	G30
G1239	C1141	A1062	U987	C911	A746	G746	U673	C597	G517	U	U370		U183	U97	C31
A1243	G1142	G1063	U988	G912	A830	G750	G674	C599	A519	U	G371	A284	G187	A95	U32
U1244	U1144	A1064	A989	A914	A831	G751	C675	G600	U520	U	A374	A285	U188	A99	G33
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C1244	G1153	U1078	G999	G924	G845	G760	G684	U611	G530	C	U389	U292	A199	C111	A40
A1245	U1157	A1080	A1002	G924	A846	A761	G685	U612	G531	C	A390	U293	U200	G112	A43
G1246	A1158	A1081	A1003	G925	A847	U766	G686	C614	A532	G	G394	A296	G206	C113	U44
A1159	U1159	U1082	A1006	C927	A848	U767	U687	U615	A533	C	A395	C297	U207	A114	C47
G1249	U1167	G1083	U1006	C928	A849	U768	U688	G616	G535	U	A396	U298	C208	A116	A46
A1250	U1168	A1084	G1010	A929	G854	G769	A690	C617	U536	C	A397	G299	U209	U117	A49
U1252	U1174	A1085	A1011	G934	G854	G770	A691	C618	U541	U	A398	G301	G213	U118	U50
C1254	C1175	A1093	G1012	G937	G857	A780	A692	U	C542	U	U401		A214	U119	A51
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C1257	G1177	U1095	U1014	C938	U862	U782	C696	U623	C544	U	C403	A306	G216	A121	G53
U1258	C1178	G1097	C1016	U939	C863	A783	A697	G624	U545	G	G404	A307	U217	A122	C54
U1261	A1180	A1098	C1017	C944	C864	G785	U698	U625	G547	U	A407	A308	G218	C125	G55
G1262	U1181	G1018	G1018	C945	U865	A786	C700	U626	G548	G	A408		A219	U126	A57
A1263	A1182	G1019	U946	U946	A866	G787	G701	A628	U549	A		C312	G220	G127	G58
G1264	C1183	G1020	G947	G947	A869	C788	C702	A629	A550	G	U411	A313		G128	G59
U1265	G1185	U1022	C948	C948	G869	U789	G703	U629	U553	G	U412	U314	U228	U129	A60
U1266	C1186	A1105	C949	C950	C873	U790	U704	U631	A554	G	U413	C315	G229	A61	
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A1271	U1188	C1107	A	A	G875	C793	U707	C633	A557	U	U415	A325	G232	A63	G64
C1272	C1189	U1109	A	C957	A876	U794	U707	C636	U558	U	A416	U329	C233	A65	A65
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C1278	A1192	A1112	G1029	C959	G880	U796	U713	C638	C561	U	U419	A336	G236	A67	C68
A1193	U1193	G1117	A1030	U960	G880	U797	G714	C562	G420	G	G421	G337		C69	
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G1282	A1197	G1035	U1034	U966	C887	G800	G717	C641	A342	U	G341	C242	G241	C72	C72
A1286	C1198	A1036	A1036	A967	A888	C802	G721	C644	C576	U	U343	G243	G243	C73	C73
					C890	C803	G722	A649	C577	C	A428	G345	U245	G74	G75

A2447	G2370	A2295	U2205	U2129	A1910	A1809	A1729	G1635	C1563	A1460	G1367	A1287
G2446	G2371	A2296	G2206	G2130	A1911	A1813	G1733	U1636	U1564	A1461	U1368	A1290
A2449	A2372	A2297	A2207	A2131	U1912	A1814	G1734	C1639	A1566	G1462	A1369	A1291
G2450	A2373	U2297	A2208	A1913	A1913	U1815	G1735	U1640	U1567	U1463	G1370	U1293
G2451	G2374	U2298	U2209	U2137	G1914	A1816	U1735	U1641	U1568	A1467	G1371	C1293
G2452	G2375	A2299	G2210	A2138	C1917	A1817	A1741	A1642	U1569	A1468	A1294	A1294
U2453	G2376	A2300	G2216	A2142	C1918	U1818	U1742	A1643	U1570	G1469	G1380	G1295
G2454	G2377	A2303	U2217	A2143	G1919	U1819	U1743	C1644	A1571	U1472	A1381	C1298
U2455	G2381	G2304	G2218	A2144	U1920	U1820	U1746	U1645	U1572	G1473	G1382	U1299
A2456	G2382	C2305	A2219	U2145	U1921	U1821	U1747	U1646	U1573	G1474	G1383	G1300
G2457	C2383	C2306	A2220	A2147	G1928	C1822	G1748	A1647	C1574	A1475	A1387	A1301
A2458	U2388	C2307	G2221	U2148	G1834	G1829	A1749	A1648	A1575	G1480	G1388	G1302
A2459	C2389	U2310	A2222	A2149	G1935	G1830	A1750	C1657	C1576	G1481	G1389	A1303
A2462	A2390	U2311	A2223	A2152	A1936	U1835	G1751	G1658	C1577	G1483	A1390	A1304
G2463	A2391	G2312	A2224	U2153	U1937	A1836	A1752	U1659	C1578	U1484	G1391	G1307
A2468	G2391	U2313	U2225	U2154	G1952	U1840	G1753	U1660	A1580	U1485	G1392	U1308
G2469	G2392	G2314	U2226	G2155	G	A1841	C1756	G1662	C1581	G1486	G1395	U1309
G2470	G2393	G2315	G2227	G2156	U	A1842	A1757	G1663	U1582	G1487	G1396	G1310
G2471	G2394	G2316	A2228	A2158	U	A1843	G1758	G1664	A1583	A1490	G1397	G1311
U2472	A2397	U2317	A2229	U2159	U	C1844	C1759	G1665	G1586	G1491	U1398	C1312
G2473	A2400	U2318	G2234	G2160	G	G1845	U1763	G1666	A1589	U1492	G1400	A1317
G2474	G2401	U2319	U2235	G2161	U	G1846	U1764	G1667	G1590	U1493	A1401	A1318
G2477	A2402	G2320	A2242	U2162	C	A1850	U1765	G1668	G1591	U1494	G1402	U1322
C2478	G2403	A2321	A2243	C2163	U	C1856	U1766	G1669	G1592	U1495	G1403	G1323
G2483	A2404	G2322	A2244	A2166	U	U1857	U1767	G1670	A1594	C1496	G1404	U1324
A2484	U2407	C2323	A2245	A2167	G	A1858	U1768	C1671	A1595	U1497	G1405	U1325
A2485	U2408	A2332	G2249	G2169	C	C1859	U1769	G1672	U1596	G1500	A1407	A1330
U2486	U2411	U2331	G2250	U2170	U	C1866	C1773	U1694	C1597	A1506	G1408	U1331
C2487	A2412	U2332	A2252	U2171	C	A1867	G1774	U1695	G1598	U1507	C1411	U1332
U2488	G2413	C2333	G2253	G2176	U	G1868	G1775	A1696	G1599	C1508	C1412	U1333
U2489	G2414	C2334	A2256	G2177	U	C1869	G1776	A1697	U1601	U1511	G1413	U1334
C2490	U2415	U2335	A2257	U2178	U	C1870	U1777	G1698	A1602	C1516	G1414	U1335
U2504	U2423	A2340	G2261	G2180	U	A1879	G1778	G1700	A1603	C1517	U1415	U1336
U2510	G2424	U2341	A2262	C2181	G	U1880	C1779	A1704	G1604	G1517	C1416	A1337
U2514	G2425	U2342	C2263	A2182	C	U1881	G1780	U1705	A1605	C1518	C1339	C1338
U2515	U2426	A2343	U2264	U2183	U	G1882	C1781	G1706	U1606	U1519	G1417	G1340
U2516	U2427	U2344	C2265	G2184	C	U1883	U1782	C1707	U1607	C1520	A1418	U1341
A2519	U2428	C2345	U2266	G2185	U	A1884	U1783	C1708	C1608	G1521	G1421	C1342
A2520	U2429	U2346	G2267	U2186	C	U1885	U1784	C1709	G1610	U1522	U1422	G1345
A2523	A2430	A2347	A2270	G2187	C	A1886	U1785	C1710	C1615	U1523	U1423	G1346
A2524	A2431	U2348	A2271	A2188	U	A1887	G1786	C1711	G1616	A1524	U1347	U1347
G2525	A2432	A2349	G2272	U2189	C	U1888	U1787	C1712	U1617	A1525	G1431	U1348
G2526	U2433	C2350	U2273	U2190	U	G1889	G1794	G1713	G1618	U1526	G1432	G1349
G2527	U2434	U2351	U2274	U2191	C	U1890	U1795	U1717	U1619	C1527	A1435	A1350
G2528	U2435	A2352	C2277	G2192	U	A1891	G1796	G1718	G1620	U1528	U1436	U1351
A2531	G2436	A2353	C2278	U2193	U	G1892	A1797	G1719	G1621	G1529	C1437	A1352
A2532	U2437	U2354	A2281	G2194	A	U1893	A1798	U1721	G1622	C1530	G1443	A1355
A2533	U2438	C2355	C2285	C2195	C	A1894	C1803	U1722	A1623	A1531	U1356	U1356
A2534	G2439	A2356	G2286	C2196	U	A1895	A1804	U1723	U1624	A1532	G1357	G1357
G2535	U2440	C2357	U2287	C2197	C	G1896	C1805	C1725	U1625	A1533	A1446	U1361
G2536	G2441	G2358	G2288	U2198	U	C1907	A1806	C1726	U1626	A1534	G1447	G1362
G2537	A2442	C2359	U2289	G2201	G	U1908	G1807	G1727	U1627	A1535	U1448	U1363
G2538	A2443	C2360	G2290	G2202	U	C1909	G1808	G1728	G1628	U1536	A1449	A1363
G2539	A2444	A2361	U2291	C2203	C	G2122						
G2540	U2446	C2362	G2292	C2204	C							



• Molecule 3: 5S rRNA

Chain B: 50% 45% 6%



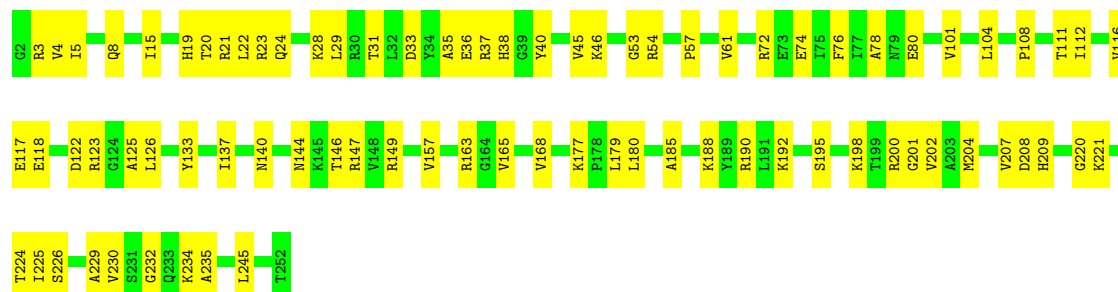
• Molecule 4: 5.8S rRNA

Chain C: 48% 47% 5%

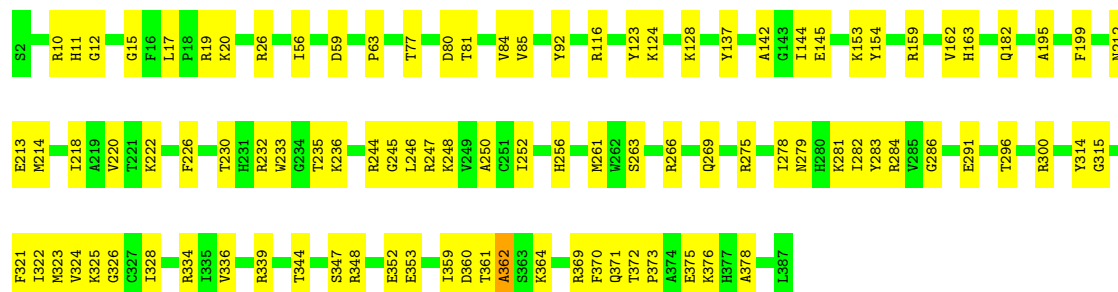




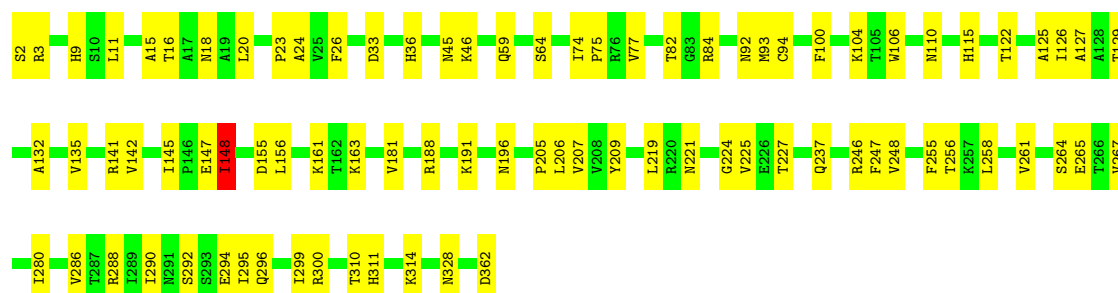
• Molecule 5: Large ribosomal subunit protein uL2A



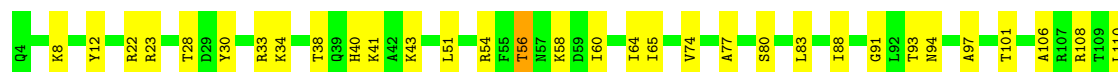
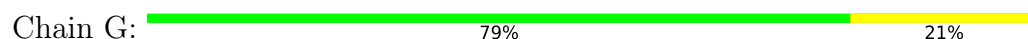
• Molecule 6: Large ribosomal subunit protein uL3



• Molecule 7: Large ribosomal subunit protein uL4A



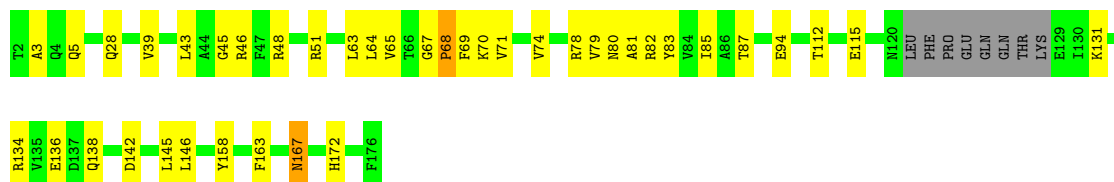
• Molecule 8: Large ribosomal subunit protein uL18





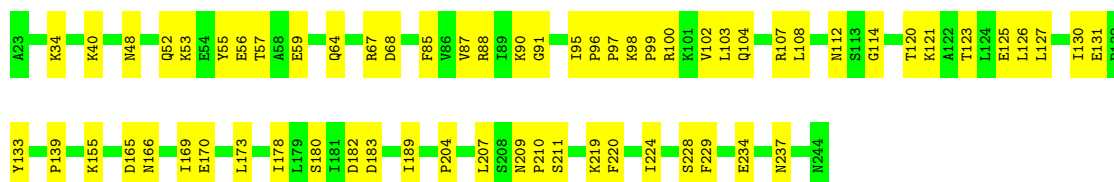
- Molecule 9: Large ribosomal subunit protein eL6B

Chain H: 73% 22% 5%



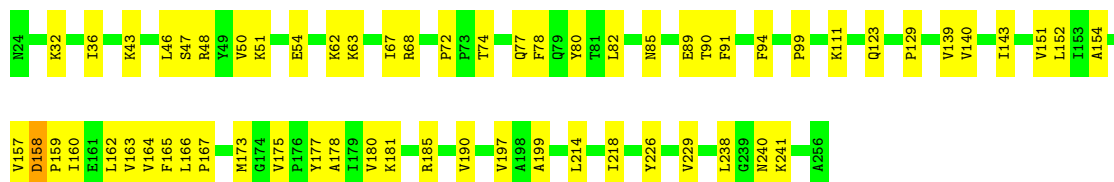
- Molecule 10: Large ribosomal subunit protein uL30A

Chain I: 72% 28%



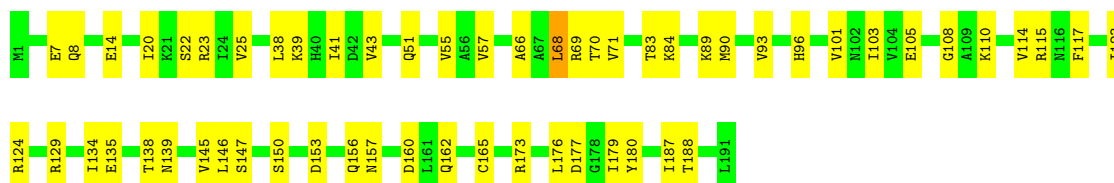
- Molecule 11: Large ribosomal subunit protein eL8A

Chain J: 74% 26%



- Molecule 12: Large ribosomal subunit protein uL6A

Chain K: 70% 29%

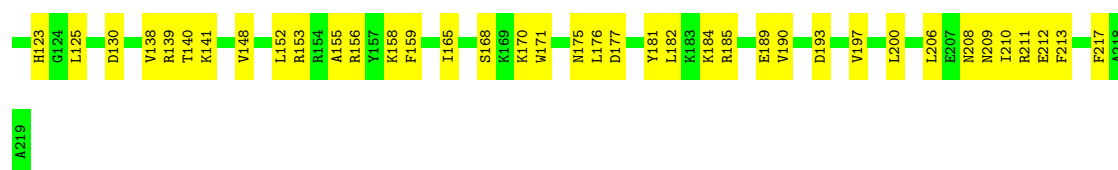


- Molecule 13: Large ribosomal subunit protein uL16

Chain L: 67% 33%

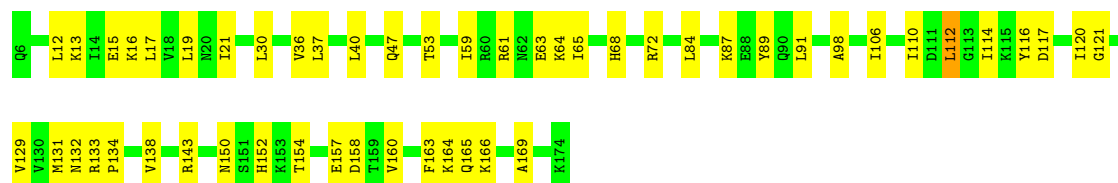






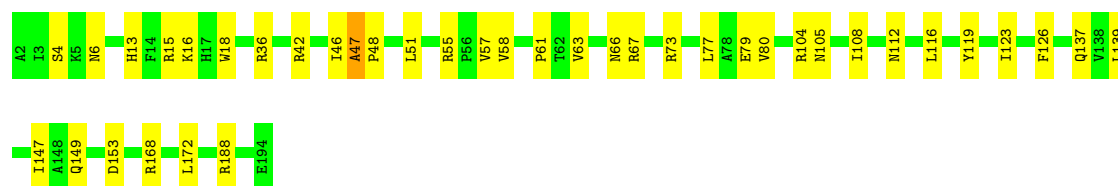
- Molecule 14: Large ribosomal subunit protein uL5B

Chain M: 70% 30%



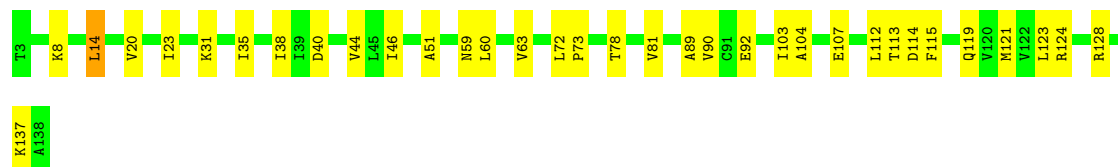
- Molecule 15: Large ribosomal subunit protein eL13A

Chain N: 80% 20%



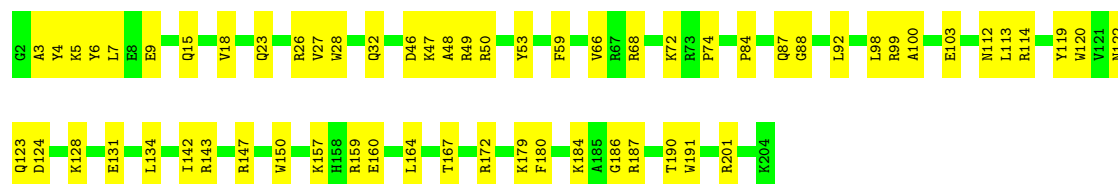
- Molecule 16: Large ribosomal subunit protein eL14A

Chain O: 75% 24%



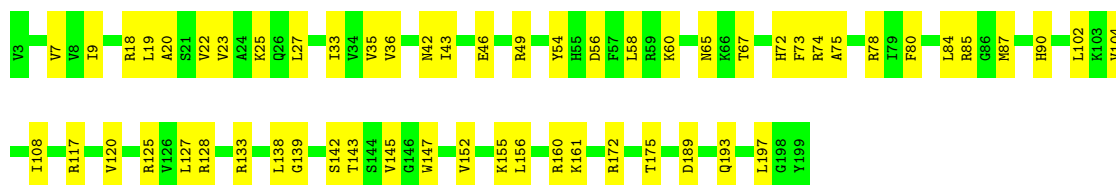
- Molecule 17: Large ribosomal subunit protein eL15A

Chain P: 70% 30%



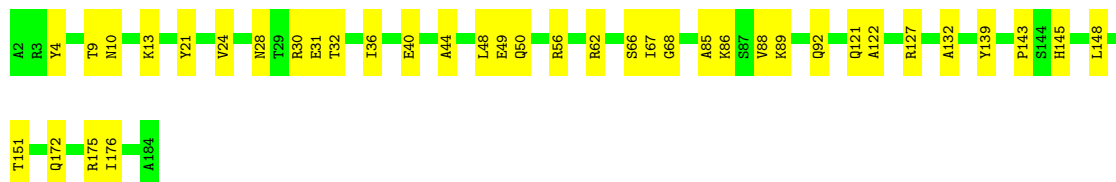
- Molecule 18: Large ribosomal subunit protein uL13A

Chain Q: 71% 29%



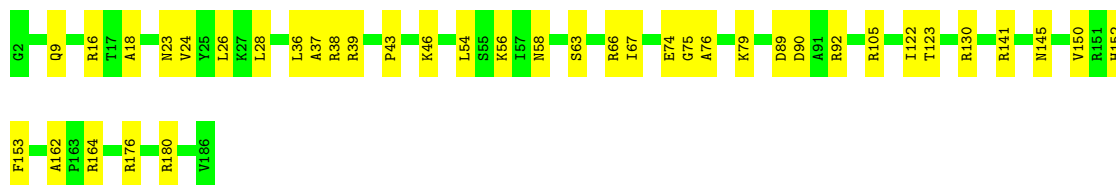
- Molecule 19: Large ribosomal subunit protein uL22A

Chain R: 79% 21%



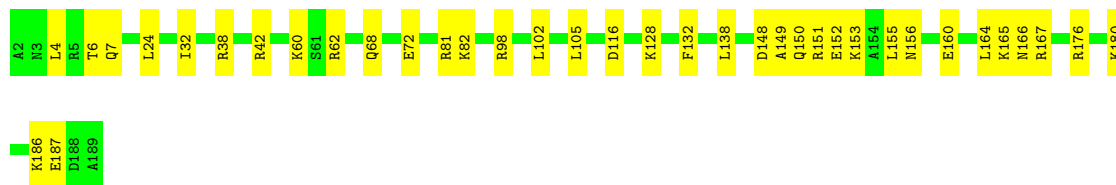
- Molecule 20: Large ribosomal subunit protein eL18A

Chain S: 79% 21%



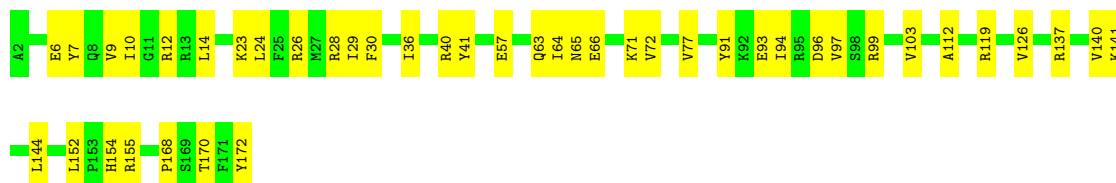
- Molecule 21: Large ribosomal subunit protein eL19A

Chain T: 80% 20%



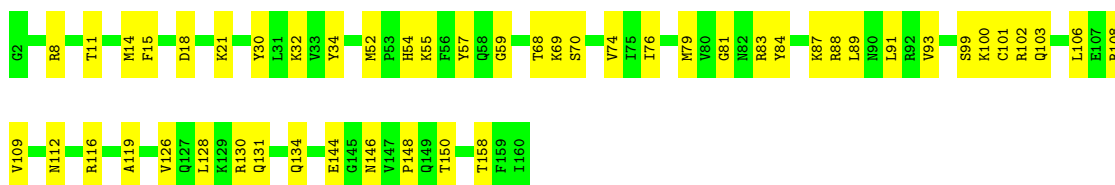
- Molecule 22: Large ribosomal subunit protein eL20A

Chain U: 75% 25%

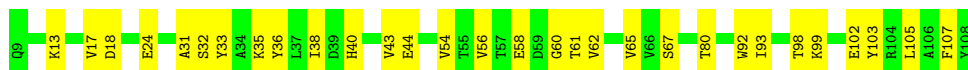


- Molecule 23: Large ribosomal subunit protein eL21A

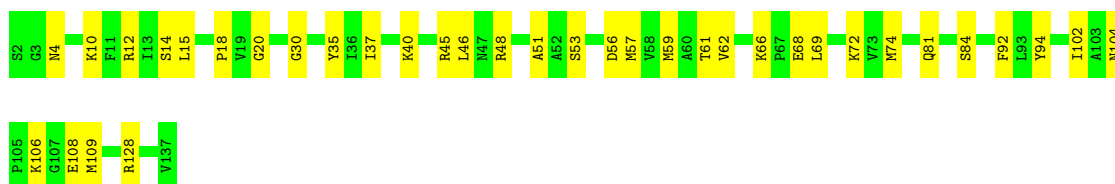
Chain V: 69% 31%



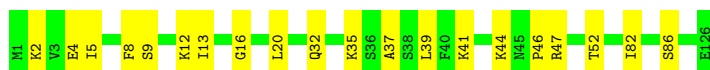
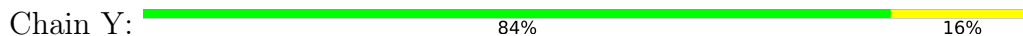
- Molecule 24: Large ribosomal subunit protein eL22A



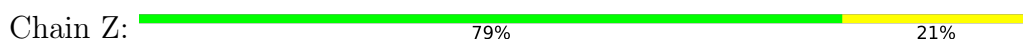
- Molecule 25: Large ribosomal subunit protein uL14A



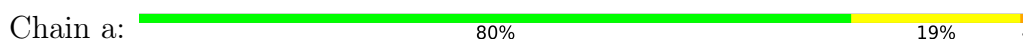
- Molecule 26: Large ribosomal subunit protein eL24A



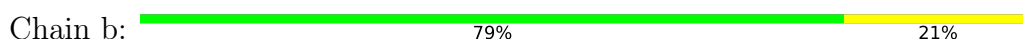
- Molecule 27: Large ribosomal subunit protein uL23

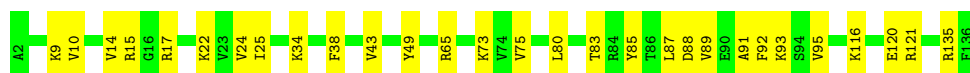


- Molecule 28: Large ribosomal subunit protein uL24A

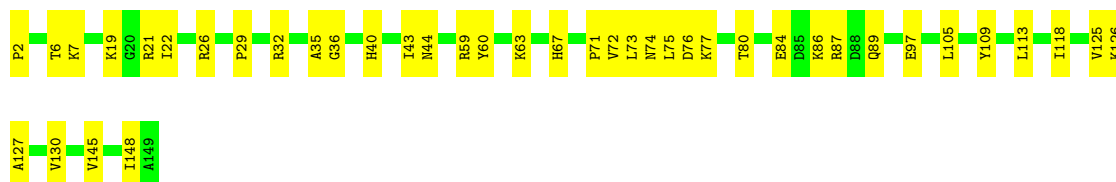


- Molecule 29: Large ribosomal subunit protein eL27A

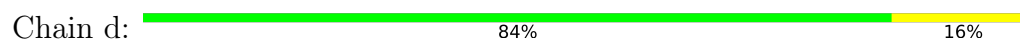




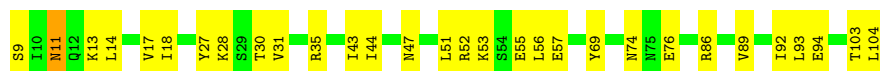
- Molecule 30: Large ribosomal subunit protein uL15



- Molecule 31: Large ribosomal subunit protein eL29



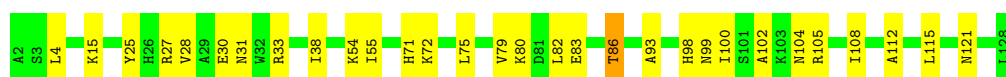
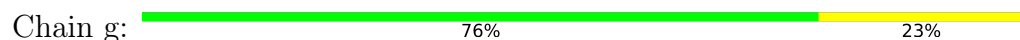
- Molecule 32: Large ribosomal subunit protein eL30



- Molecule 33: Large ribosomal subunit protein eL31A



- Molecule 34: Large ribosomal subunit protein eL32



- Molecule 35: Large ribosomal subunit protein eL33A





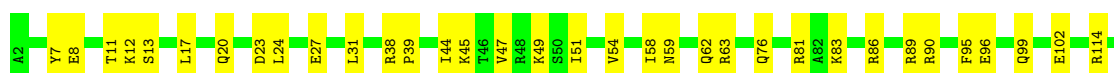
- Molecule 36: Large ribosomal subunit protein eL34A

Chain i: 75% 25%



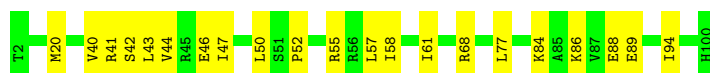
- Molecule 37: Large ribosomal subunit protein uL29A

Chain j: 71% 29%



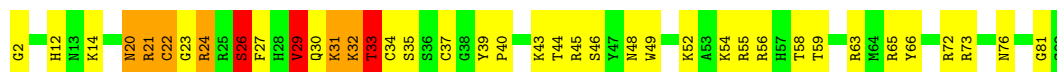
- Molecule 38: Large ribosomal subunit protein eL36A

Chain k: 79% 21%



- Molecule 39: Large ribosomal subunit protein eL37A

Chain l: 52% 37% 7%



- Molecule 40: Large ribosomal subunit protein eL38

Chain m: 69% 31%



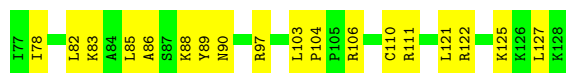
- Molecule 41: Large ribosomal subunit protein eL39

Chain n: 70% 30%



- Molecule 42: Large ribosomal subunit protein eL40A

Chain o:  65% 35%




- Molecule 43: Large ribosomal subunit protein eL41A

Chain p:  72% 28%



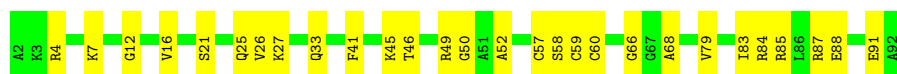
- Molecule 44: Large ribosomal subunit protein eL42A

Chain q:  82% 18%



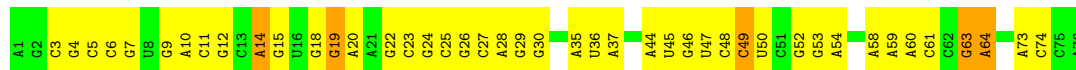
- Molecule 45: Large ribosomal subunit protein eL43A

Chain r:  69% 31%



- Molecule 46: tRNA

Chain s:  41% 52% 7%



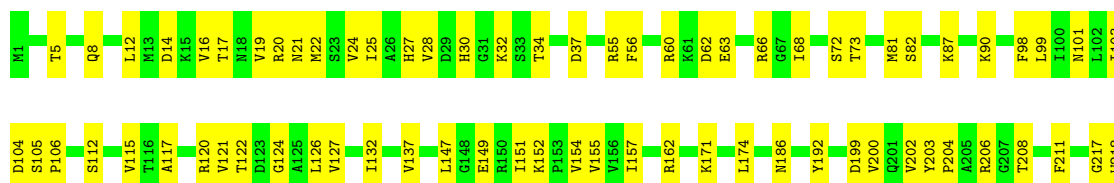
- Molecule 46: tRNA

Chain t:  52% 43% 5%

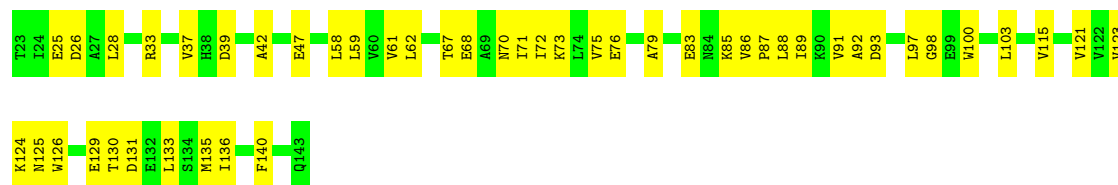


- Molecule 47: Elongation factor 2

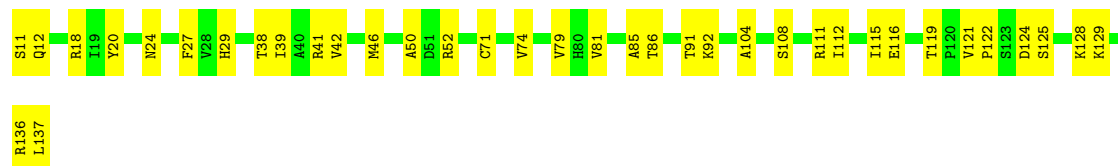
Chain x:  68% 31%



- Molecule 48: Small ribosomal subunit protein eS12



- Molecule 49: Small ribosomal subunit protein uS11B

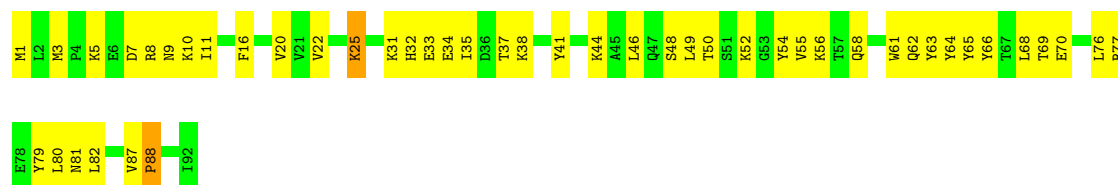


- Molecule 50: Small ribosomal subunit protein eS26A



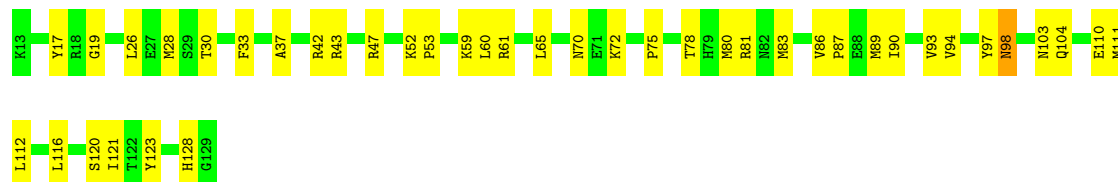
- Molecule 51: Small ribosomal subunit protein eS10A





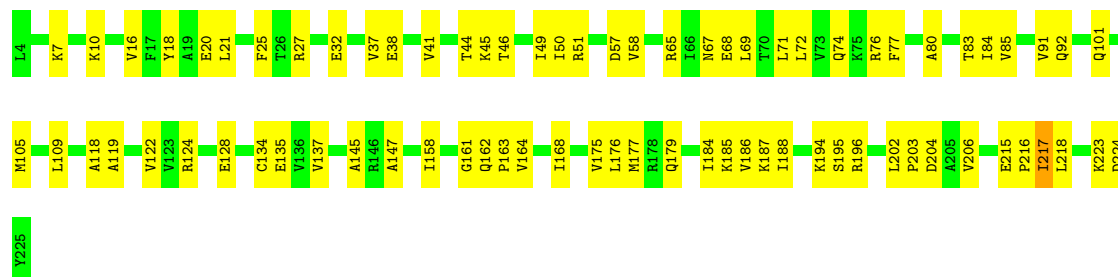
- Molecule 52: Small ribosomal subunit protein uS19

Chain SE: 65% 34% .



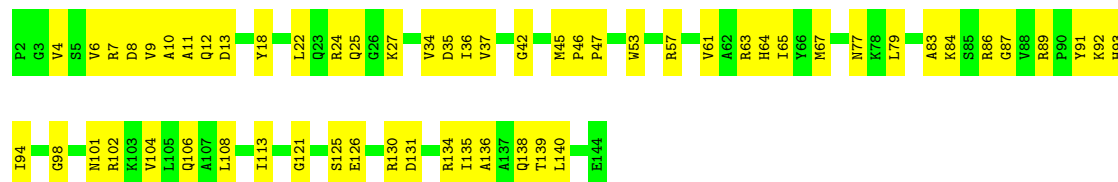
- Molecule 53: Small ribosomal subunit protein uS3

Chain SA: 66% 34%



- Molecule 54: Small ribosomal subunit protein eS19A

Chain SI: 59% 41%



- Molecule 55: Small ribosomal subunit protein uS10

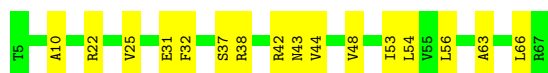
Chain SJ: 63% 36% .



- Molecule 56: Small ribosomal subunit protein eS28A

Chain SL: 75% 25%





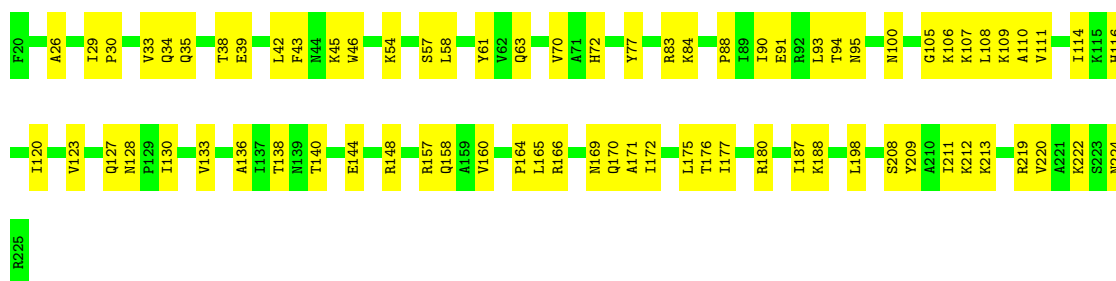
- Molecule 57: Small ribosomal subunit protein uS14A

Chain SM: 62% 38%



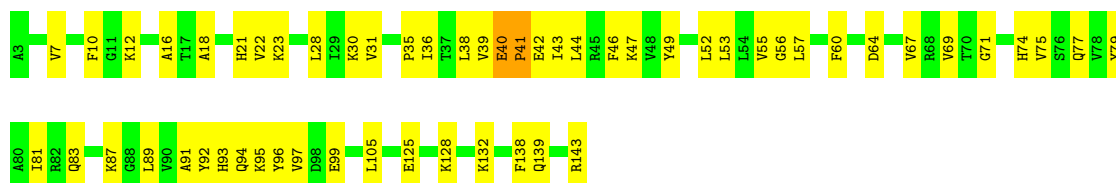
- Molecule 58: Small ribosomal subunit protein uS7

Chain SB: 64% 36%



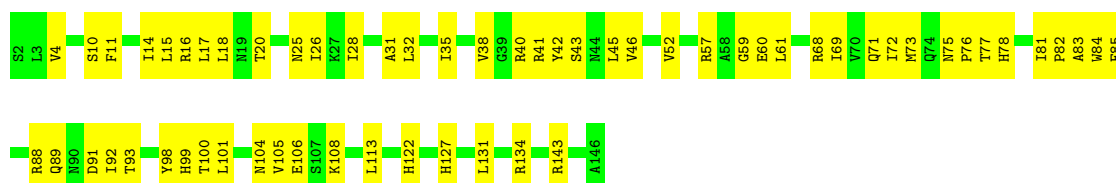
- Molecule 59: Small ribosomal subunit protein uS9A

Chain SF: 60% 38%



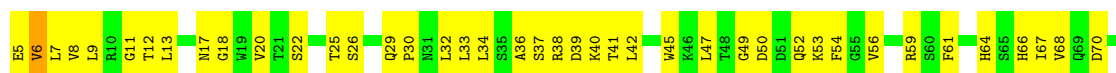
- Molecule 60: Small ribosomal subunit protein uS13A

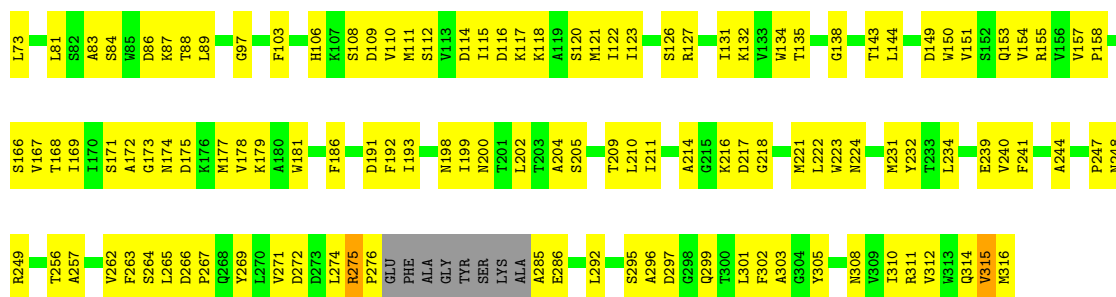
Chain SH: 59% 41%



- Molecule 61: Small ribosomal subunit protein RACK1

Chain SO: 46% 50%





- Molecule 62: Small ribosomal subunit protein eS31

Chain SN: 74% 26%



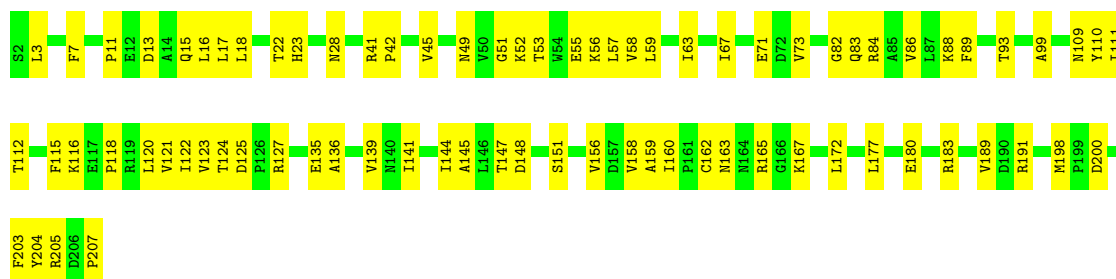
- Molecule 63: Small ribosomal subunit protein eS17A

Chain SG: 59% 40%



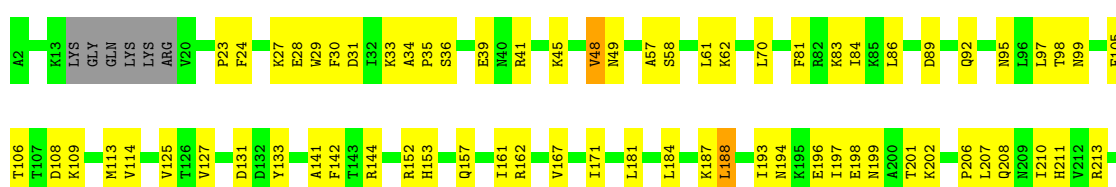
- Molecule 64: Small ribosomal subunit protein uS2A

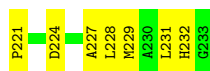
Chain SP: 62% 38%



- Molecule 65: Small ribosomal subunit protein eS1A

Chain SQ: 65% 32%





- Molecule 66: Small ribosomal subunit protein uS5

Chain SR: 71% 28%



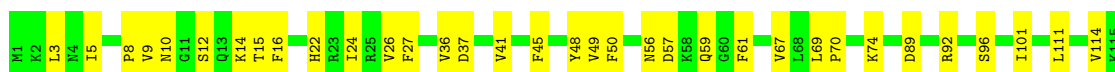
- Molecule 67: Small ribosomal subunit protein eS4A

Chain SS: 62% 37%



- Molecule 68: Small ribosomal subunit protein eS6A

Chain ST: 72% 27%



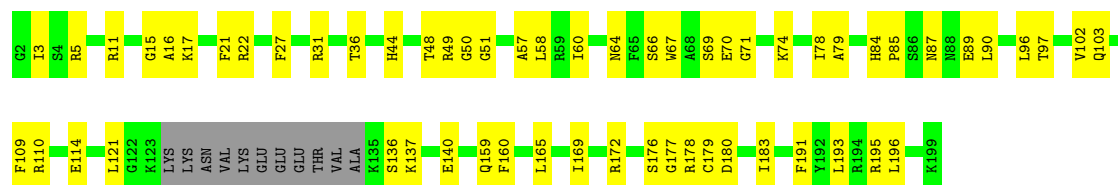
- Molecule 69: Small ribosomal subunit protein eS7A

Chain SU: 60% 39%



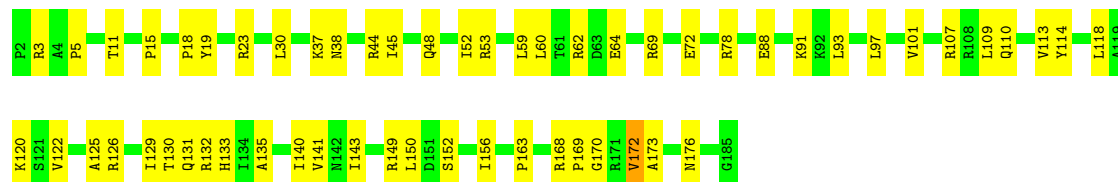
- Molecule 70: Small ribosomal subunit protein eS8A

Chain SV: 65% 30% 6%



- Molecule 71: Small ribosomal subunit protein uS4A

Chain SW: 69% 30%



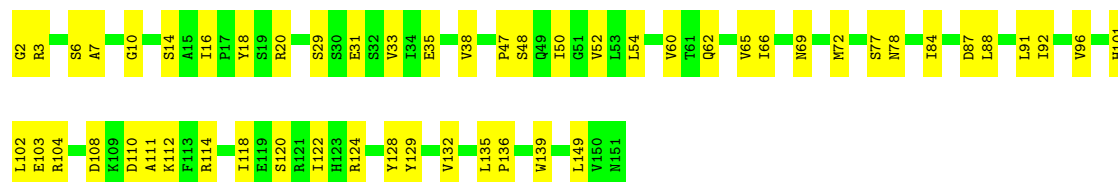
- Molecule 72: Small ribosomal subunit protein uS17A

Chain SX: 79% 20%



- Molecule 73: Small ribosomal subunit protein uS15

Chain SY: 65% 35%



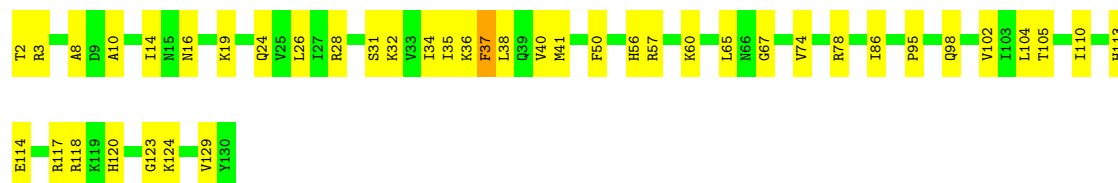
- Molecule 74: Small ribosomal subunit protein eS21A

Chain Sa: 74% 25%



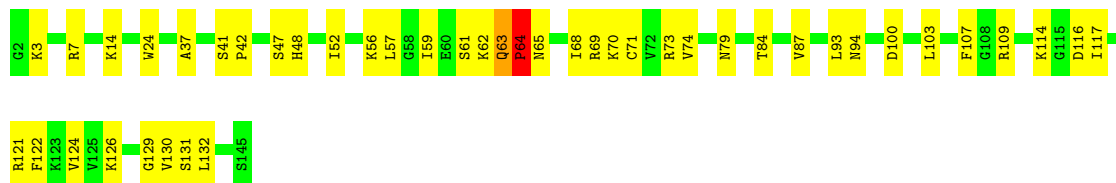
- Molecule 75: Small ribosomal subunit protein uS8A

Chain Sb: 67% 32%




- Molecule 76: Small ribosomal subunit protein uS12A

Chain Sc:  69% 29% ..



- Molecule 77: Small ribosomal subunit protein eS24A

Chain Sd:  78% 22%




- Molecule 78: Small ribosomal subunit protein eS27A

Chain Sf:  62% 38%



- Molecule 79: Small ribosomal subunit protein eS30A

Chain Sg:  78% 22%



- Molecule 80: Small ribosomal subunit protein eS25A

Chain SK:  68% 28% 5%



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	39857	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	50	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	Not provided	
Image detector	GATAN K2 QUANTUM (4k x 4k)	Depositor

## 5 Model quality ⓘ

### 5.1 Standard geometry ⓘ

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	2	0.09	0/42115	0.24	0/65623
2	A	0.08	0/76357	0.20	0/119043
3	B	0.07	0/2883	0.21	0/4491
4	C	0.09	0/3746	0.21	0/5832
5	D	0.13	0/1933	0.29	0/2598
6	E	0.10	0/3146	0.30	0/4228
7	F	0.19	2/2800 (0.1%)	0.30	0/3790
8	G	0.13	0/2400	0.34	1/3239 (0.0%)
9	H	0.14	0/1329	0.33	0/1794
10	I	0.15	0/1821	0.35	0/2451
11	J	0.12	0/1836	0.32	0/2481
12	K	0.13	0/1529	0.29	0/2060
13	L	0.17	0/1801	0.40	0/2416
14	M	0.13	0/1367	0.33	0/1834
15	N	0.11	0/1568	0.28	0/2106
16	O	0.16	0/1068	0.34	0/1438
17	P	0.13	0/1757	0.27	0/2354
18	Q	0.15	0/1585	0.34	0/2128
19	R	0.09	0/1439	0.27	0/1938
20	S	0.25	0/1465	0.34	0/1965
21	T	0.13	0/1532	0.29	0/2043
22	U	0.10	0/1473	0.27	0/1980
23	V	0.14	0/1296	0.33	0/1739
24	W	0.15	0/812	0.39	0/1099
25	X	0.08	0/1018	0.23	0/1369
26	Y	0.11	0/850	0.28	0/1152
27	Z	0.13	0/979	0.32	0/1321
28	a	0.10	0/995	0.25	0/1329
29	b	0.16	0/1106	0.36	0/1485
30	c	0.09	0/1200	0.24	0/1607
31	d	0.12	0/473	0.32	0/629
32	e	0.15	0/745	0.38	0/1001
33	f	0.12	0/890	0.29	0/1196
34	g	0.09	0/1034	0.24	0/1385

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
35	h	0.15	0/868	0.37	0/1168
36	i	0.10	0/890	0.24	0/1189
37	j	0.20	0/978	0.32	0/1301
38	k	0.12	0/772	0.35	0/1026
39	l	0.65	0/660	0.59	1/875 (0.1%)
40	m	0.13	0/618	0.36	0/826
41	n	0.09	0/443	0.29	0/588
42	o	0.14	0/416	0.30	0/553
43	p	0.08	0/230	0.17	0/296
44	q	0.12	0/836	0.30	0/1104
45	r	0.11	0/701	0.29	0/934
46	s	0.07	0/1795	0.19	0/2797
46	t	0.09	0/1796	0.21	0/2799
47	x	0.17	0/6685	0.46	2/9050 (0.0%)
48	SD	0.16	0/883	0.47	0/1199
49	SZ	0.16	0/901	0.45	0/1217
50	Se	0.15	0/761	0.43	0/1016
51	SC	0.30	0/769	0.50	0/1039
52	SE	0.22	0/936	0.46	0/1259
53	SA	0.19	0/1754	0.42	0/2361
54	SI	0.26	0/1130	0.50	0/1517
55	SJ	0.17	0/807	0.42	0/1091
56	SL	0.13	0/493	0.34	0/663
57	SM	0.12	0/452	0.28	0/600
58	SB	0.15	0/1625	0.40	0/2197
59	SF	0.23	0/1125	0.50	2/1510 (0.1%)
60	SH	0.19	0/1207	0.49	0/1623
61	SO	0.22	0/2376	0.51	1/3235 (0.0%)
62	SN	0.16	0/571	0.48	0/768
63	SG	0.17	0/971	0.46	0/1303
64	SP	0.15	0/1644	0.35	0/2249
65	SQ	0.14	0/1823	0.39	0/2447
66	SR	0.15	0/1656	0.36	0/2251
67	SS	0.16	0/2097	0.41	0/2823
68	ST	0.14	0/1839	0.31	0/2460
69	SU	0.21	0/1498	0.47	0/2019
70	SV	0.12	0/1501	0.33	0/2006
71	SW	0.14	0/1504	0.33	0/2016
72	SX	0.11	0/1168	0.32	0/1575
73	SY	0.14	0/1215	0.35	0/1638
74	Sa	0.16	0/682	0.42	0/921
75	Sb	0.18	0/1038	0.40	0/1395
76	Sc	0.18	0/1139	0.45	0/1518



Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
77	Sd	0.14	0/1087	0.34	0/1449
78	Sf	0.10	0/620	0.30	0/838
79	Sg	0.13	0/480	0.35	0/639
80	SK	0.13	0/821	0.36	0/1096
All	All	0.13	2/224609 (0.0%)	0.28	7/329588 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	F	147	GLU	C-N	-7.01	1.25	1.33
7	F	148	ILE	C-N	5.26	1.44	1.34

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
59	SF	41	PRO	N-CA-C	7.62	123.75	113.84
8	G	251	PRO	CA-N-CD	-5.77	103.92	112.00
61	SO	265	LEU	CB-CA-C	-5.58	110.13	116.54
59	SF	41	PRO	CB-CA-C	-5.34	104.27	111.85
47	x	606	ILE	CA-C-N	5.15	127.80	120.49

There are no chirality outliers.

There are no planarity outliers.

## 5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	2	37653	0	18945	747	0
2	A	68216	0	34282	1149	0
3	B	2579	0	1304	47	0
4	C	3353	0	1695	64	0
5	D	1899	0	1957	72	0
6	E	3075	0	3142	81	0
7	F	2748	0	2859	64	0
8	G	2351	0	2294	49	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
9	H	1307	0	1377	29	0
10	I	1784	0	1862	50	0
11	J	1804	0	1877	47	0
12	K	1508	0	1572	44	0
13	L	1764	0	1804	56	0
14	M	1346	0	1370	36	0
15	N	1543	0	1608	34	0
16	O	1053	0	1149	32	0
17	P	1720	0	1779	53	0
18	Q	1555	0	1659	45	0
19	R	1416	0	1433	26	0
20	S	1441	0	1543	34	0
21	T	1515	0	1606	35	0
22	U	1437	0	1475	34	0
23	V	1272	0	1312	38	0
24	W	796	0	812	19	0
25	X	1003	0	1048	28	0
26	Y	836	0	706	15	0
27	Z	964	0	1025	19	0
28	a	984	0	1075	20	0
29	b	1080	0	1122	28	0
30	c	1169	0	1211	37	0
31	d	462	0	491	8	0
32	e	737	0	792	22	0
33	f	876	0	912	24	0
34	g	1013	0	1077	25	0
35	h	850	0	880	32	0
36	i	880	0	945	23	0
37	j	969	0	1078	24	0
38	k	766	0	844	18	0
39	l	645	0	649	43	0
40	m	612	0	682	17	0
41	n	436	0	475	10	0
42	o	410	0	446	14	0
43	p	229	0	273	7	0
44	q	824	0	892	25	0
45	r	694	0	738	26	0
46	s	1605	0	816	34	0
46	t	1606	0	816	20	0
47	x	6559	0	6627	203	0
48	SD	875	0	878	39	0
49	SZ	891	0	883	28	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
50	Se	750	0	799	20	0
51	SC	752	0	719	47	0
52	SE	916	0	941	38	0
53	SA	1729	0	1812	61	0
54	SI	1112	0	1124	66	0
55	SJ	797	0	863	40	0
56	SL	491	0	524	12	0
57	SM	442	0	432	17	0
58	SB	1605	0	1669	58	0
59	SF	1105	0	1166	58	0
60	SH	1188	0	1218	59	0
61	SO	2326	0	2287	152	0
62	SN	560	0	560	19	0
63	SG	961	0	999	41	0
64	SP	1603	0	1610	68	0
65	SQ	1798	0	1890	56	0
66	SR	1626	0	1715	53	0
67	SS	2056	0	2140	81	0
68	ST	1815	0	1894	58	0
69	SU	1473	0	1555	68	0
70	SV	1476	0	1501	50	0
71	SW	1479	0	1556	44	0
72	SX	1142	0	1209	24	0
73	SY	1192	0	1255	41	0
74	Sa	673	0	662	29	0
75	Sb	1021	0	1060	41	0
76	Sc	1121	0	1196	40	0
77	Sd	1073	0	1132	23	0
78	Sf	610	0	633	28	0
79	Sg	472	0	521	13	0
80	SK	810	0	875	26	0
All	All	209284	0	155614	4444	0

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

The worst 5 of 4444 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
66:SR:242:ILE:HG13	66:SR:243:TYR:CD1	1.99	0.98
1:2:222:A:H61	1:2:838:G:H1	1.03	0.97

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
39:I:22:CYS:HB2	39:I:37:CYS:SG	2.03	0.97
53:SA:20:GLU:HG2	53:SA:77:PHE:HZ	1.28	0.97
54:SI:47:PRO:HG3	54:SI:53:TRP:CZ3	1.99	0.96

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

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

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
5	D	249/251 (99%)	236 (95%)	13 (5%)	0	100	100
6	E	384/386 (100%)	363 (94%)	20 (5%)	1 (0%)	37	66
7	F	359/361 (99%)	350 (98%)	9 (2%)	0	100	100
8	G	292/294 (99%)	280 (96%)	12 (4%)	0	100	100
9	H	163/175 (93%)	155 (95%)	7 (4%)	1 (1%)	22	50
10	I	220/222 (99%)	216 (98%)	4 (2%)	0	100	100
11	J	231/233 (99%)	223 (96%)	7 (3%)	1 (0%)	30	60
12	K	189/191 (99%)	178 (94%)	11 (6%)	0	100	100
13	L	216/218 (99%)	208 (96%)	8 (4%)	0	100	100
14	M	167/169 (99%)	162 (97%)	5 (3%)	0	100	100
15	N	191/193 (99%)	180 (94%)	10 (5%)	1 (0%)	25	54
16	O	134/136 (98%)	131 (98%)	3 (2%)	0	100	100
17	P	201/203 (99%)	200 (100%)	1 (0%)	0	100	100
18	Q	195/197 (99%)	190 (97%)	5 (3%)	0	100	100
19	R	181/183 (99%)	176 (97%)	5 (3%)	0	100	100
20	S	183/185 (99%)	178 (97%)	4 (2%)	1 (0%)	25	54
21	T	186/188 (99%)	184 (99%)	2 (1%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
22	U	169/171 (99%)	166 (98%)	3 (2%)	0	100	100
23	V	157/159 (99%)	150 (96%)	7 (4%)	0	100	100
24	W	98/100 (98%)	92 (94%)	6 (6%)	0	100	100
25	X	134/136 (98%)	134 (100%)	0	0	100	100
26	Y	124/126 (98%)	121 (98%)	2 (2%)	1 (1%)	16	44
27	Z	119/121 (98%)	114 (96%)	5 (4%)	0	100	100
28	a	123/125 (98%)	121 (98%)	2 (2%)	0	100	100
29	b	133/135 (98%)	128 (96%)	5 (4%)	0	100	100
30	c	146/148 (99%)	141 (97%)	5 (3%)	0	100	100
31	d	56/58 (97%)	53 (95%)	3 (5%)	0	100	100
32	e	94/96 (98%)	93 (99%)	1 (1%)	0	100	100
33	f	107/109 (98%)	104 (97%)	3 (3%)	0	100	100
34	g	125/127 (98%)	123 (98%)	2 (2%)	0	100	100
35	h	104/106 (98%)	97 (93%)	6 (6%)	1 (1%)	13	39
36	i	110/112 (98%)	106 (96%)	4 (4%)	0	100	100
37	j	117/119 (98%)	115 (98%)	2 (2%)	0	100	100
38	k	97/99 (98%)	94 (97%)	3 (3%)	0	100	100
39	l	79/81 (98%)	68 (86%)	6 (8%)	5 (6%)	1	7
40	m	75/77 (97%)	74 (99%)	1 (1%)	0	100	100
41	n	48/50 (96%)	47 (98%)	1 (2%)	0	100	100
42	o	50/52 (96%)	47 (94%)	3 (6%)	0	100	100
43	p	23/25 (92%)	23 (100%)	0	0	100	100
44	q	101/103 (98%)	96 (95%)	5 (5%)	0	100	100
45	r	89/91 (98%)	87 (98%)	2 (2%)	0	100	100
47	x	840/842 (100%)	755 (90%)	84 (10%)	1 (0%)	48	78
48	SD	119/121 (98%)	95 (80%)	24 (20%)	0	100	100
49	SZ	125/127 (98%)	101 (81%)	23 (18%)	1 (1%)	16	44
50	Se	92/94 (98%)	81 (88%)	9 (10%)	2 (2%)	5	24
51	SC	90/92 (98%)	78 (87%)	10 (11%)	2 (2%)	5	24
52	SE	115/117 (98%)	96 (84%)	18 (16%)	1 (1%)	14	41
53	SA	220/222 (99%)	206 (94%)	11 (5%)	3 (1%)	9	31

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
54	SI	141/143 (99%)	132 (94%)	8 (6%)	1 (1%)	19	47
55	SJ	98/100 (98%)	91 (93%)	7 (7%)	0	100	100
56	SL	61/63 (97%)	59 (97%)	2 (3%)	0	100	100
57	SM	51/53 (96%)	47 (92%)	4 (8%)	0	100	100
58	SB	204/206 (99%)	182 (89%)	21 (10%)	1 (0%)	25	54
59	SF	139/141 (99%)	131 (94%)	6 (4%)	2 (1%)	9	31
60	SH	143/145 (99%)	123 (86%)	20 (14%)	0	100	100
61	SO	300/312 (96%)	238 (79%)	57 (19%)	5 (2%)	7	28
62	SN	71/73 (97%)	52 (73%)	19 (27%)	0	100	100
63	SG	119/121 (98%)	106 (89%)	13 (11%)	0	100	100
64	SP	204/206 (99%)	191 (94%)	13 (6%)	0	100	100
65	SQ	222/232 (96%)	201 (90%)	21 (10%)	0	100	100
66	SR	214/216 (99%)	205 (96%)	9 (4%)	0	100	100
67	SS	256/258 (99%)	226 (88%)	29 (11%)	1 (0%)	30	60
68	ST	226/228 (99%)	213 (94%)	12 (5%)	1 (0%)	30	60
69	SU	182/184 (99%)	174 (96%)	7 (4%)	1 (0%)	25	54
70	SV	183/198 (92%)	171 (93%)	12 (7%)	0	100	100
71	SW	182/184 (99%)	166 (91%)	15 (8%)	1 (0%)	25	54
72	SX	140/142 (99%)	132 (94%)	8 (6%)	0	100	100
73	SY	148/150 (99%)	144 (97%)	4 (3%)	0	100	100
74	Sa	85/87 (98%)	80 (94%)	4 (5%)	1 (1%)	11	35
75	Sb	127/129 (98%)	123 (97%)	4 (3%)	0	100	100
76	Sc	142/144 (99%)	127 (89%)	13 (9%)	2 (1%)	9	31
77	Sd	132/134 (98%)	129 (98%)	3 (2%)	0	100	100
78	Sf	79/81 (98%)	79 (100%)	0	0	100	100
79	Sg	58/60 (97%)	56 (97%)	2 (3%)	0	100	100
80	SK	99/108 (92%)	98 (99%)	1 (1%)	0	100	100
All	All	11826/12024 (98%)	11092 (94%)	696 (6%)	38 (0%)	38	66

5 of 38 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
6	E	362	ALA

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Mol	Chain	Res	Type
9	H	68	PRO
35	h	104	PRO
49	SZ	42	VAL
51	SC	87	VAL

### 5.3.2 Protein sidechains ⓘ

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	
5	D	190/193 (98%)	190 (100%)	0	100	100
6	E	319/322 (99%)	319 (100%)	0	100	100
7	F	288/288 (100%)	286 (99%)	2 (1%)	81	88
8	G	241/243 (99%)	240 (100%)	1 (0%)	89	93
9	H	139/154 (90%)	138 (99%)	1 (1%)	81	88
10	I	186/186 (100%)	186 (100%)	0	100	100
11	J	187/191 (98%)	187 (100%)	0	100	100
12	K	168/171 (98%)	166 (99%)	2 (1%)	67	80
13	L	185/185 (100%)	183 (99%)	2 (1%)	70	81
14	M	145/147 (99%)	144 (99%)	1 (1%)	81	88
15	N	154/154 (100%)	154 (100%)	0	100	100
16	O	107/107 (100%)	106 (99%)	1 (1%)	75	86
17	P	175/175 (100%)	175 (100%)	0	100	100
18	Q	160/160 (100%)	160 (100%)	0	100	100
19	R	138/145 (95%)	138 (100%)	0	100	100
20	S	150/150 (100%)	150 (100%)	0	100	100
21	T	152/153 (99%)	152 (100%)	0	100	100
22	U	155/155 (100%)	155 (100%)	0	100	100
23	V	135/136 (99%)	134 (99%)	1 (1%)	81	88
24	W	87/87 (100%)	86 (99%)	1 (1%)	70	81

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
25	X	104/104 (100%)	104 (100%)	0	100	100
26	Y	56/108 (52%)	56 (100%)	0	100	100
27	Z	104/105 (99%)	103 (99%)	1 (1%)	73	83
28	a	108/108 (100%)	106 (98%)	2 (2%)	52	71
29	b	112/115 (97%)	112 (100%)	0	100	100
30	c	117/118 (99%)	117 (100%)	0	100	100
31	d	46/46 (100%)	46 (100%)	0	100	100
32	e	81/81 (100%)	80 (99%)	1 (1%)	67	80
33	f	92/96 (96%)	92 (100%)	0	100	100
34	g	107/109 (98%)	105 (98%)	2 (2%)	52	71
35	h	90/90 (100%)	90 (100%)	0	100	100
36	i	95/95 (100%)	94 (99%)	1 (1%)	70	81
37	j	104/104 (100%)	103 (99%)	1 (1%)	73	83
38	k	80/81 (99%)	77 (96%)	3 (4%)	28	54
39	l	67/67 (100%)	58 (87%)	9 (13%)	3	12
40	m	68/68 (100%)	67 (98%)	1 (2%)	60	76
41	n	45/45 (100%)	45 (100%)	0	100	100
42	o	45/47 (96%)	45 (100%)	0	100	100
43	p	22/23 (96%)	22 (100%)	0	100	100
44	q	87/88 (99%)	85 (98%)	2 (2%)	45	67
45	r	71/71 (100%)	71 (100%)	0	100	100
47	x	715/715 (100%)	709 (99%)	6 (1%)	79	87
48	SD	88/98 (90%)	87 (99%)	1 (1%)	70	81
49	SZ	81/96 (84%)	80 (99%)	1 (1%)	67	80
50	Se	81/81 (100%)	80 (99%)	1 (1%)	67	80
51	SC	77/85 (91%)	76 (99%)	1 (1%)	65	78
52	SE	95/98 (97%)	95 (100%)	0	100	100
53	SA	182/182 (100%)	182 (100%)	0	100	100
54	SI	115/115 (100%)	113 (98%)	2 (2%)	56	74
55	SJ	93/93 (100%)	91 (98%)	2 (2%)	47	68
56	SL	55/56 (98%)	54 (98%)	1 (2%)	54	73

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
57	SM	47/47 (100%)	47 (100%)	0	100	100
58	SB	172/173 (99%)	171 (99%)	1 (1%)	84	90
59	SF	117/117 (100%)	117 (100%)	0	100	100
60	SH	127/128 (99%)	127 (100%)	0	100	100
61	SO	246/257 (96%)	246 (100%)	0	100	100
62	SN	57/64 (89%)	57 (100%)	0	100	100
63	SG	105/110 (96%)	102 (97%)	3 (3%)	37	61
64	SP	170/173 (98%)	170 (100%)	0	100	100
65	SQ	200/205 (98%)	198 (99%)	2 (1%)	73	83
66	SR	175/175 (100%)	173 (99%)	2 (1%)	70	81
67	SS	220/220 (100%)	218 (99%)	2 (1%)	75	86
68	ST	189/195 (97%)	186 (98%)	3 (2%)	58	75
69	SU	163/165 (99%)	161 (99%)	2 (1%)	67	80
70	SV	148/159 (93%)	148 (100%)	0	100	100
71	SW	156/157 (99%)	156 (100%)	0	100	100
72	SX	126/127 (99%)	125 (99%)	1 (1%)	79	87
73	SY	127/127 (100%)	127 (100%)	0	100	100
74	Sa	71/74 (96%)	71 (100%)	0	100	100
75	Sb	110/110 (100%)	108 (98%)	2 (2%)	54	73
76	Sc	119/119 (100%)	117 (98%)	2 (2%)	56	74
77	Sd	112/112 (100%)	112 (100%)	0	100	100
78	Sf	70/70 (100%)	70 (100%)	0	100	100
79	Sg	50/51 (98%)	50 (100%)	0	100	100
80	SK	85/89 (96%)	85 (100%)	0	100	100
All	All	9906/10114 (98%)	9836 (99%)	70 (1%)	80	88

5 of 70 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
66	SR	222	TYR
67	SS	197	HIS
72	SX	133	LYS
39	l	21	ARG
39	l	14	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 133 such sidechains are listed below:

Mol	Chain	Res	Type
72	SX	16	GLN
72	SX	138	ASN
78	Sf	42	ASN
25	X	28	ASN
23	V	146	ASN

### 5.3.3 RNA ⓘ

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	2	1764/1799 (98%)	502 (28%)	32 (1%)
2	A	3183/3394 (93%)	526 (16%)	12 (0%)
3	B	120/121 (99%)	12 (10%)	1 (0%)
4	C	157/158 (99%)	30 (19%)	1 (0%)
46	s	74/75 (98%)	14 (18%)	0
46	t	74/75 (98%)	14 (18%)	0
All	All	5372/5622 (95%)	1098 (20%)	46 (0%)

5 of 1098 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	2	2	A
1	2	4	C
1	2	9	U
1	2	10	G
1	2	25	C

5 of 46 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	2	1584	G
2	A	1814	A
1	2	1633	A
2	A	601	U
2	A	2450	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.