



Full wwPDB EM Validation Report ⓘ

Nov 21, 2022 – 06:34 PM JST

PDB ID : 7D63
EMDB ID : EMD-30588
Title : Cryo-EM structure of 90S preribosome with inactive Utp24 (state C)
Authors : Du, Y.; Zhang, J.; An, W.; Ye, K.
Deposited on : 2020-09-29
Resolution : 12.30 Å (reported)
Based on initial model : 6LQR

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

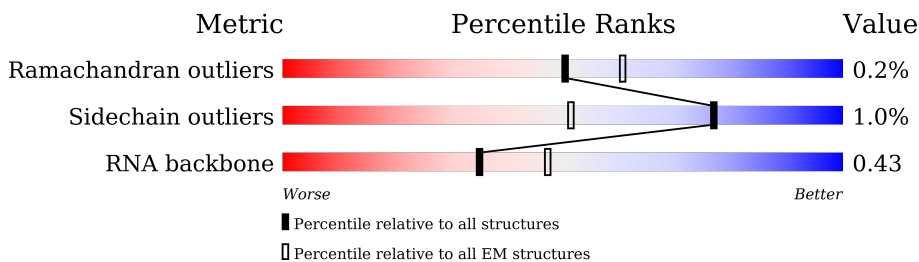
EMDB validation analysis : 0.0.1.dev43
Mogul : 1.8.5 (274361), CSD as541be (2020)
MolProbity : 4.02b-467
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ : 1.9.9
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.31.3

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 12.30 Å.

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



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

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

Mol	Chain	Length	Quality of chain
1	3A	333	
2	5A	700	
3	SA	1812	
4	SC	255	
5	SF	261	
6	SG	225	
7	SH	236	
8	SI	190	

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Mol	Chain	Length	Quality of chain
9	SJ	200	28% 81% 17%
10	SK	197	30% 86% 13%
11	SM	155	28% 77% 21%
12	SO	151	72% 87% 11%
13	SP	137	68% 84% 14%
14	SR	143	26% 87% 13%
15	SX	130	83% 96%
16	SY	145	26% 70% 29%
17	SZ	135	27% 74% 24%
18	Sc	82	83% 96%
19	Sd	67	24% 94% 6%
20	3B	327	30% 73% 27%
20	3C	327	28% 68% 31%
21	3D	504	18% 72% 27%
22	3E	511	35% 83% 16%
23	3F	573	18% 78% 21%
24	3G	126	16% 93%
24	3H	126	32% 94%
25	A4	776	19% 84% 15%
26	A5	643	25% 79% 20%
27	A8	713	32% 71% 25%
28	A9	575	6% 22% 78%
29	AE	1769	62% 86% 13%
30	AF	513	26% 95%
31	AG	896	21% 91% 8%

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Mol	Chain	Length	Quality of chain
32	B1	900	26% 87% 12%
33	B2	943	19% 86% 13%
34	B3	817	38% 89% 7%
35	B8	594	26% 80% 20%
36	BE	939	19% 86% 13%
37	B6	440	43% 84% 15%
38	5B	214	24% 27% 72%
39	5C	554	32% 81% 17%
40	5D	250	40% 65% 33%
41	5E	593	13% 30% 67%
42	5F	183	43% 98% ..
43	5G	290	31% 73% 24%
44	5H	610	12% 88%
45	5I	489	27% 93% 6%
46	5J	217	33% 62% 38%
47	5K	189	50% 92% 7%
48	RA	707	27% 47% 52%
49	RB	357	23% 36% 62%
50	RE	1237	83% 86% 13%
51	RF	297	78% 79% 19%
52	RG	252	25% 84% 14%
52	RH	252	41% 90% 9%
53	RJ	1183	20% 66% 33%
54	RK	367	24% 96% ..
55	RL	1056	60% 76% 24%

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Mol	Chain	Length	Quality of chain
55	RM	1056	
56	RN	810	
57	RO	552	
58	RP	2493	
59	RQ	899	
60	RS	480	
61	RY	534	
62	X1	611	
63	RT	326	
64	ST	146	
65	SU	144	
66	RD	1729	
67	RZ	1267	

2 Entry composition [i](#)

There are 71 unique types of molecules in this entry. The entry contains 225233 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 U3 snoRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	3A	175	3711	1661	648	1227	175	0	0

- Molecule 2 is a RNA chain called 5' ETS.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	5A	192	4117	1838	746	1341	192	0	0

- Molecule 3 is a RNA chain called 18S rRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
3	SA	1331	28383	12684	5049	9319	1331	0	0

- Molecule 4 is a protein called 40S ribosomal protein S1-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	SC	230	1830	1156	335	335	4	0	0

- Molecule 5 is a protein called 40S ribosomal protein S4-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	SF	229	1815	1161	331	320	3	0	0

- Molecule 6 is a protein called 40S ribosomal protein S5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	SG	213	1669	1045	307	314	3	0	0

- Molecule 7 is a protein called 40S ribosomal protein S6-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	SH	167	1327	834	256	235	2	0	0

- Molecule 8 is a protein called 40S ribosomal protein S7-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	SI	165	1321	853	226	242		0	0

- Molecule 9 is a protein called 40S ribosomal protein S8-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	SJ	166	1324	824	262	236	2	0	0

- Molecule 10 is a protein called 40S ribosomal protein S9-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	SK	171	1388	879	268	240	1	0	0

- Molecule 11 is a protein called 40S ribosomal protein S11-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	SM	123	997	641	189	164	3	0	0

- Molecule 12 is a protein called 40S ribosomal protein S13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	SO	134	1087	698	202	186	1	0	0

- Molecule 13 is a protein called 40S ribosomal protein S14-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	SP	118	868	536	164	165	3	0	0

- Molecule 14 is a protein called 40S ribosomal protein S16-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
14	SR	125	Total	C	N	O	0	0
			973	625	174	174		

- Molecule 15 is a protein called 40S ribosomal protein S22-B.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	SX	127	Total	C	N	O	S	0	0
			1003	640	183	177	3		

- Molecule 16 is a protein called 40S ribosomal protein S23-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	SY	103	Total	C	N	O	S	0	0
			786	503	144	137	2		

- Molecule 17 is a protein called 40S ribosomal protein S24-A.

Mol	Chain	Residues	Atoms				AltConf	Trace
17	SZ	102	Total	C	N	O	0	0
			809	517	148	144		

- Molecule 18 is a protein called 40S ribosomal protein S27-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	Sc	80	Total	C	N	O	S	0	0
			603	377	109	112	5		

- Molecule 19 is a protein called 40S ribosomal protein S28-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	Sd	63	Total	C	N	O	S	0	0
			497	306	99	91	1		

- Molecule 20 is a protein called rRNA 2'-O-methyltransferase fibrillar.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	3B	240	Total	C	N	O	S	0	0
			1865	1184	333	338	10		
20	3C	225	Total	C	N	O	S	0	0
			1763	1120	316	317	10		

- Molecule 21 is a protein called Nucleolar protein 56.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
21	3D	369	2848	1811	489	540	8	0	0

- Molecule 22 is a protein called Nucleolar protein 58.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
22	3E	431	3028	1888	543	588	9	0	0

- Molecule 23 is a protein called Ribosomal RNA-processing protein 9.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
23	3F	454	3643	2315	638	680	10	0	0

- Molecule 24 is a protein called 13 kDa ribonucleoprotein-associated protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
24	3G	121	916	583	158	171	4	0	0
24	3H	121	916	583	158	171	4	0	0

- Molecule 25 is a protein called U3 small nucleolar RNA-associated protein 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
25	A4	662	5226	3309	910	986	21	0	0

- Molecule 26 is a protein called U3 small nucleolar RNA-associated protein 5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
26	A5	514	3976	2520	688	755	13	0	0

- Molecule 27 is a protein called U3 small nucleolar RNA-associated protein 8.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
27	A8	532	3229	2008	592	626	3	0	0

- Molecule 28 is a protein called U3 small nucleolar RNA-associated protein 9.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
28	A9	128	939	594	173	170	2	0	0

- Molecule 29 is a protein called U3 small nucleolar RNA-associated protein 10.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
29	AE	1534	9955	6242	1771	1923	19	0	0

- Molecule 30 is a protein called U3 small nucleolar RNA-associated protein 15.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
30	AF	493	3911	2462	702	735	12	0	0

- Molecule 31 is a protein called NET1-associated nuclear protein 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
31	AG	826	6570	4181	1111	1259	19	0	0

- Molecule 32 is a protein called Periodic tryptophan protein 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
32	B1	793	6331	4046	1085	1182	18	0	0

- Molecule 33 is a protein called U3 small nucleolar RNA-associated protein 12.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
33	B2	825	6502	4156	1096	1223	27	0	0

- Molecule 34 is a protein called U3 small nucleolar RNA-associated protein 13.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
34	B3	757	5919	3769	993	1130	27	0	0

- Molecule 35 is a protein called U3 small nucleolar RNA-associated protein 18.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
35	B8	477	3764	2387	662	705	10	0	0

- Molecule 36 is a protein called U3 small nucleolar RNA-associated protein 21.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
36	BE	820	6450	4090	1114	1225	21	0	0

- Molecule 37 is a protein called U3 small nucleolar RNA-associated protein 6.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
37	B6	374	2800	1782	501	505	12	0	0

- Molecule 38 is a protein called Bud site selection protein 21.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
38	5B	60	495	310	101	84	0	0

- Molecule 39 is a protein called U3 small nucleolar RNA-associated protein 7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
39	5C	458	3612	2276	636	689	11	0	0

- Molecule 40 is a protein called U3 small nucleolar RNA-associated protein 11.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
40	5D	167	1396	862	266	263	5	0	0

- Molecule 41 is a protein called U3 small nucleolar RNA-associated protein MPP10.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
41	5E	193	1564	970	280	310	4	0	0

- Molecule 42 is a protein called U3 small nucleolar ribonucleoprotein protein IMP3.

Mol	Chain	Residues	Atoms					AltConf	Trace
42	5F	182	Total	C	N	O	S	0	0
			1530	967	287	269	7		

- Molecule 43 is a protein called U3 small nucleolar ribonucleoprotein protein IMP4.

Mol	Chain	Residues	Atoms					AltConf	Trace
43	5G	219	Total	C	N	O	S	0	0
			1756	1107	325	318	6		

- Molecule 44 is a protein called Something about silencing protein 10.

Mol	Chain	Residues	Atoms				AltConf	Trace
44	5H	74	Total	C	N	O	0	0
			596	373	122	101		

- Molecule 45 is a protein called Protein SOF1.

Mol	Chain	Residues	Atoms					AltConf	Trace
45	5I	461	Total	C	N	O	S	0	0
			3765	2354	686	709	16		

- Molecule 46 is a protein called rRNA-processing protein FCF2.

Mol	Chain	Residues	Atoms					AltConf	Trace
46	5J	134	Total	C	N	O	S	0	0
			1131	715	206	207	3		

- Molecule 47 is a protein called rRNA-processing protein FCF1.

Mol	Chain	Residues	Atoms					AltConf	Trace
47	5K	175	Total	C	N	O	S	0	0
			1403	896	256	241	10		

- Molecule 48 is a protein called Ribosome biogenesis protein ENP2.

Mol	Chain	Residues	Atoms					AltConf	Trace
48	RA	338	Total	C	N	O	S	0	0
			2709	1713	463	524	9		

- Molecule 49 is a protein called U3 small nucleolar ribonucleoprotein protein LCP5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
49	RB	134	1108	664	227	214	3	0	0

- Molecule 50 is a protein called U3 small nucleolar RNA-associated protein 22.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
50	RE	1079	8716	5666	1437	1589	24	0	0

- Molecule 51 is a protein called Ribosomal RNA-processing protein 7.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
51	RF	241	1963	1253	335	367	8	0	0

- Molecule 52 is a protein called Ribosomal RNA small subunit methyltransferase NEP1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
52	RG	216	1701	1079	296	315	11	0	0
52	RH	230	1799	1142	313	333	11	0	0

- Molecule 53 is a protein called Ribosome biogenesis protein BMS1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
53	RJ	796	6379	4086	1136	1128	29	0	0

- Molecule 54 is a protein called RNA 3'-terminal phosphate cyclase-like protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
54	RK	360	2781	1781	473	516	11	0	0

- Molecule 55 is a protein called RNA cytidine acetyltransferase.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
55	RL	805	4539	2760	885	887	7	0	0
55	RM	766	3779	2247	766	766		0	0

- Molecule 56 is a protein called Nucleolar complex protein 14.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
56	RN	607	4529	2861	820	837	11	0	0

- Molecule 57 is a protein called Nucleolar complex protein 4.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
57	RO	525	3766	2412	646	696	12	0	0

- Molecule 58 is a protein called U3 small nucleolar RNA-associated protein 20.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
58	RP	2108	12171	7483	2291	2381	16	0	0

- Molecule 59 is a protein called U3 small nucleolar RNA-associated protein 14.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
59	RQ	275	1853	1139	356	356	2	0	0

- Molecule 60 is a protein called Essential nuclear protein 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
60	RS	251	2051	1340	349	359	3	0	0

- Molecule 61 is a protein called Protein BFR2.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
61	RY	37	299	191	48	60	0	0

- Molecule 62 is a protein called Unassigned peptides 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
62	X1	22	110	66	22	22	0	0

- Molecule 63 is a protein called Pno1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
63	RT	212	1587	1010	290	283	4	0	0

- Molecule 64 is a protein called 40S ribosomal protein S18-A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
64	ST	110	896	565	170	159	2	0	0

- Molecule 65 is a protein called 40S ribosomal protein S19-A.

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

- Molecule 66 is a protein called rRNA biogenesis protein RRP5.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
66	RD	316	2412	1541	414	452	5	0	0

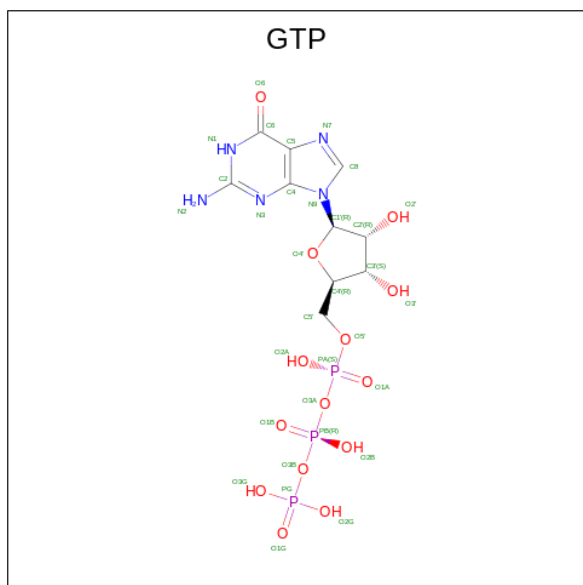
- Molecule 67 is a protein called Probable ATP-dependent RNA helicase DHR1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
67	RZ	839	6604	4215	1146	1208	35	1	0

- Molecule 68 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
68	Sc	1	1	1	0
68	5K	1	1	1	0

- Molecule 69 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula: C₁₀H₁₆N₅O₁₄P₃).

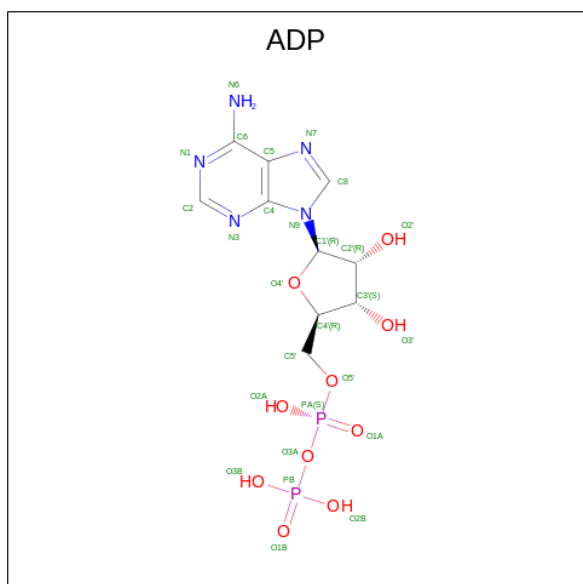


Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
69	RJ	1	32	10	5	14	3	0

- Molecule 70 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
			Total	Mg	
70	RJ	1	1	1	0

- Molecule 71 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).

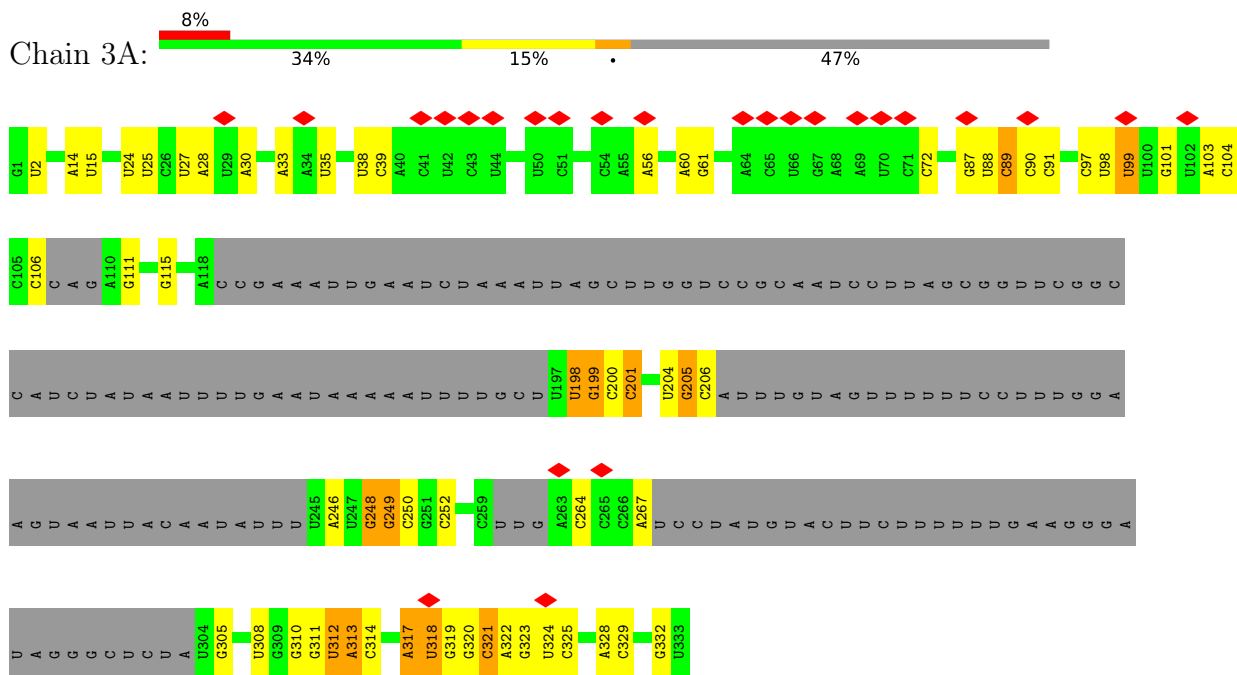


Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
71	RZ	1	27	10	5	10	2	0

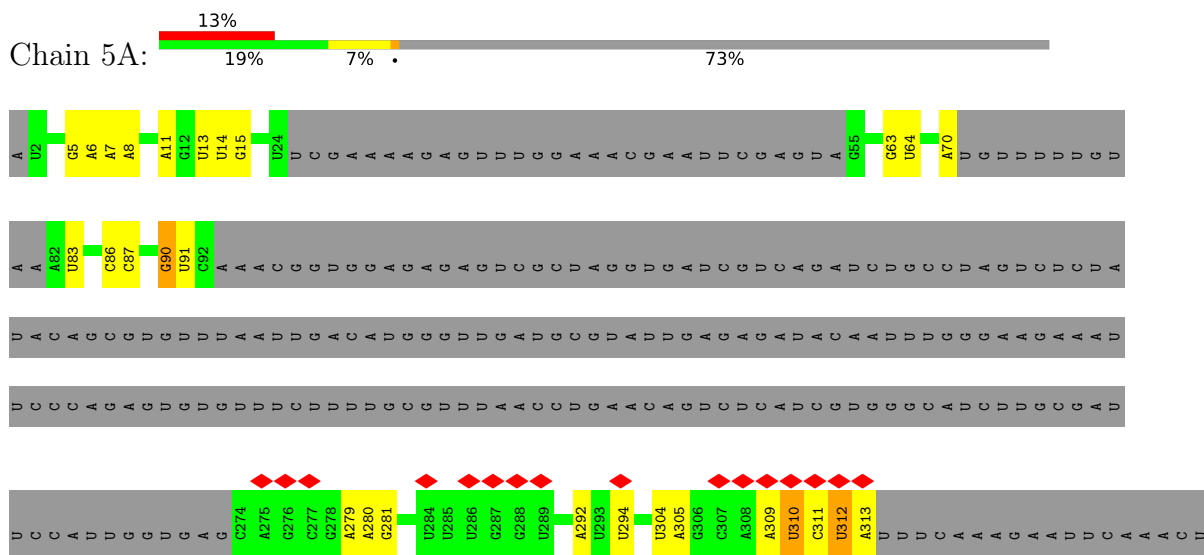
3 Residue-property plots [i](#)

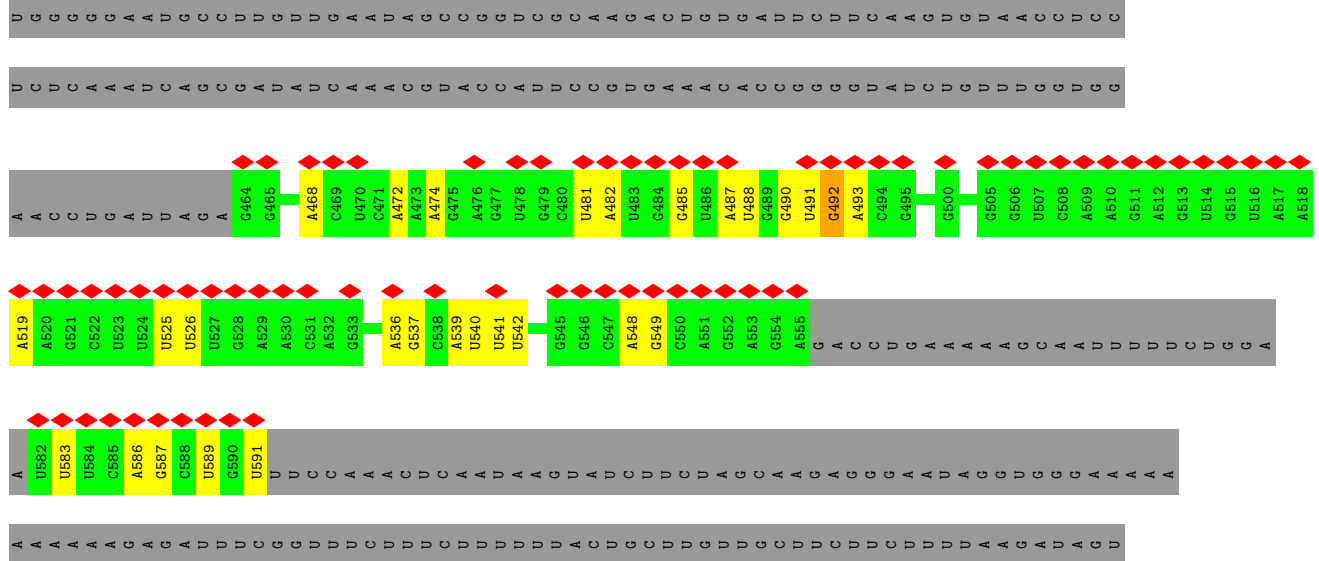
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

● Molecule 1: U3 snoRNA

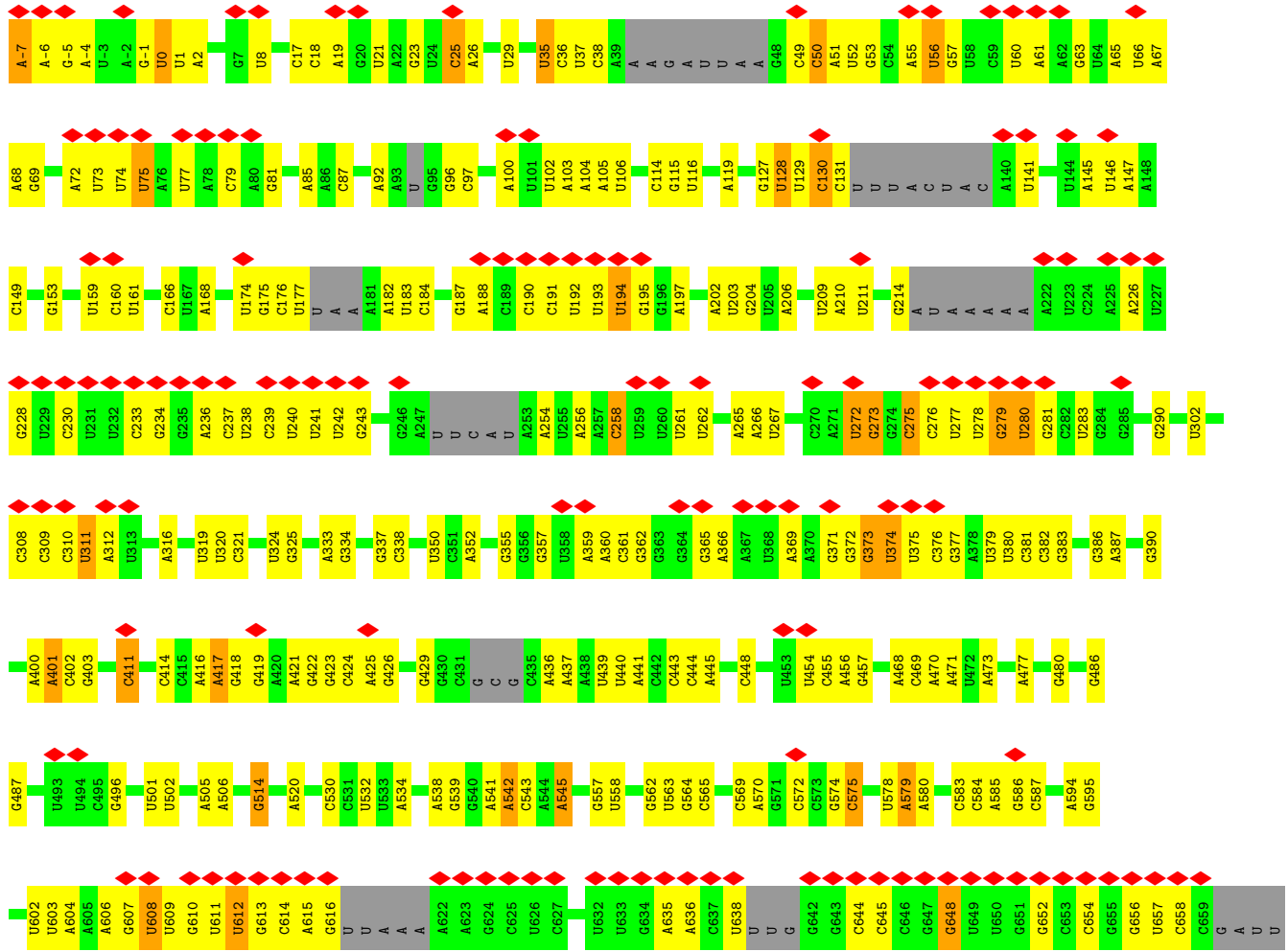


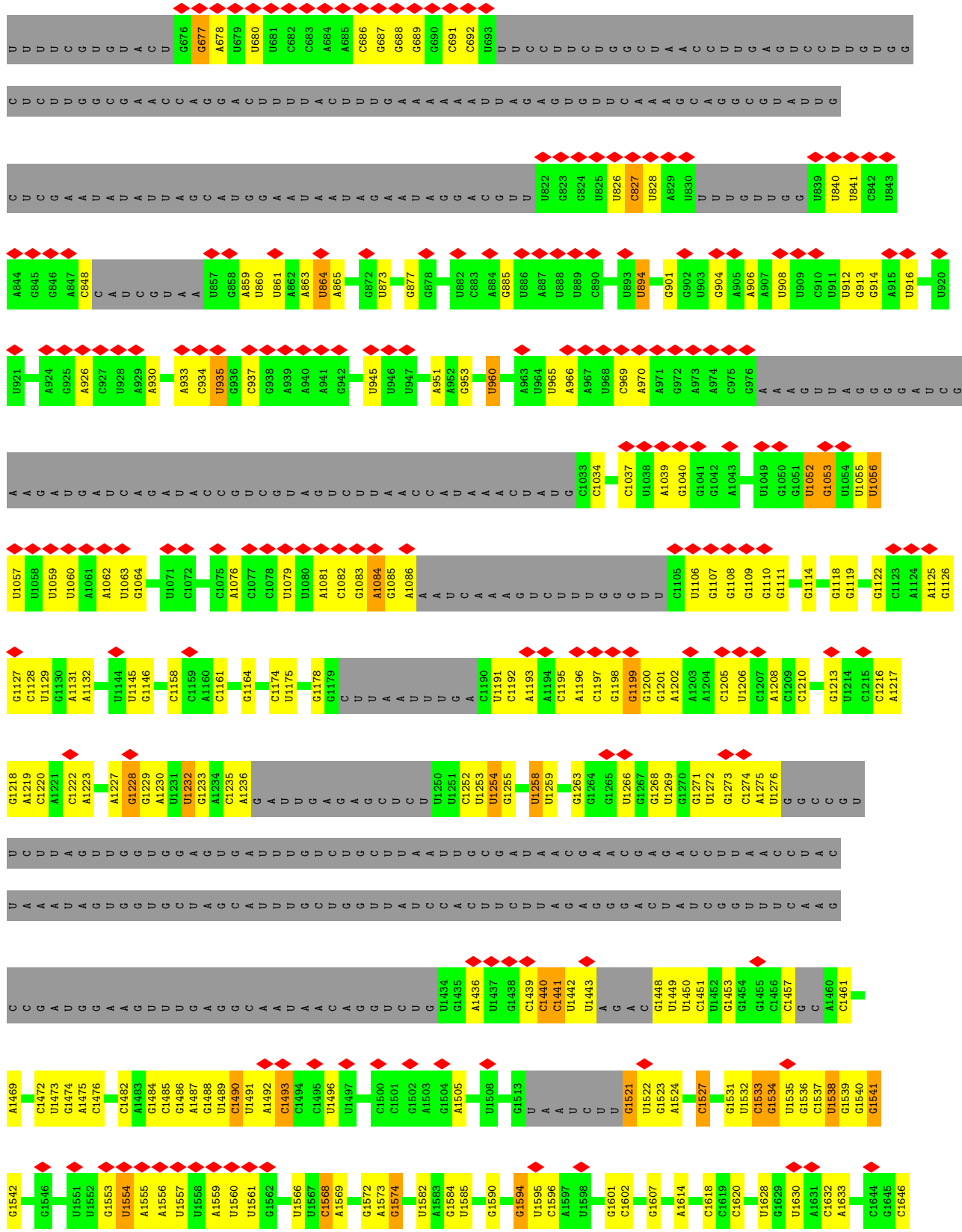
● Molecule 2: 5' ETS

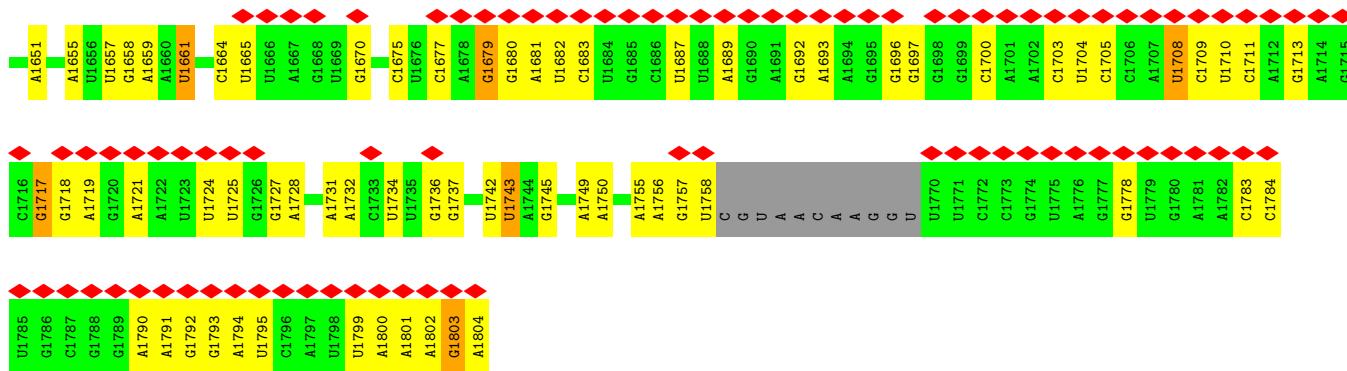




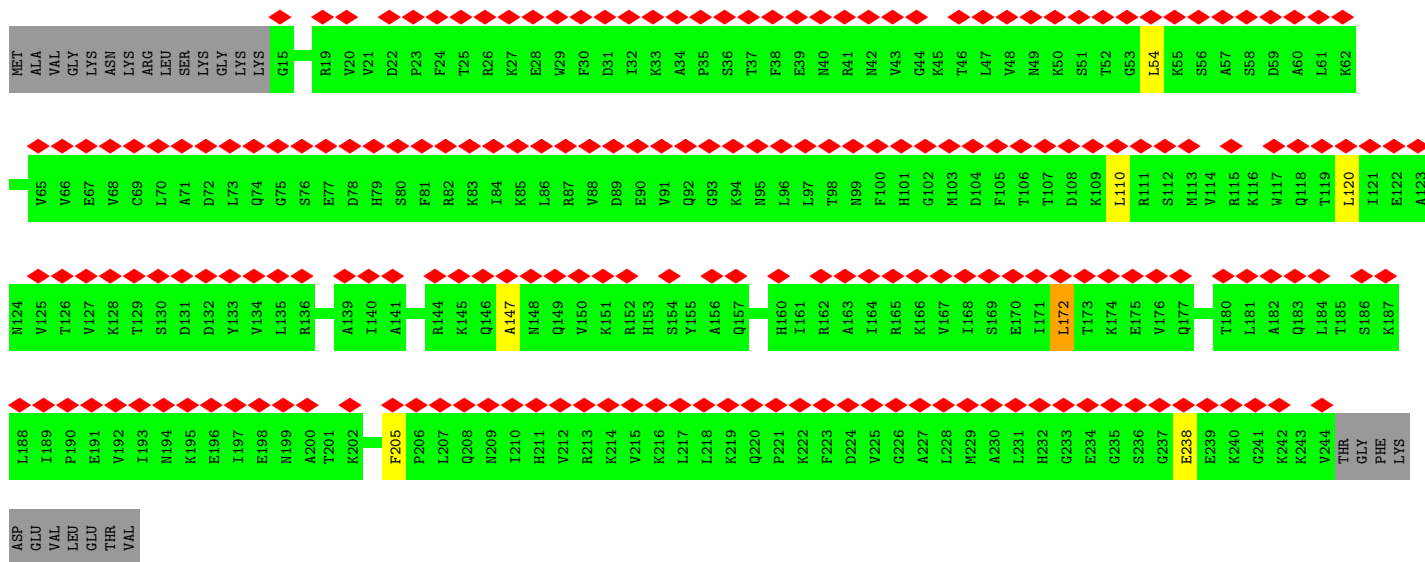
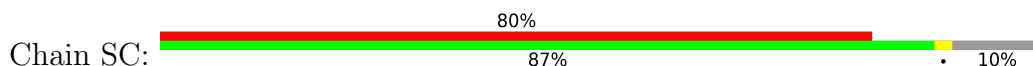
• Molecule 3: 18S rRNA



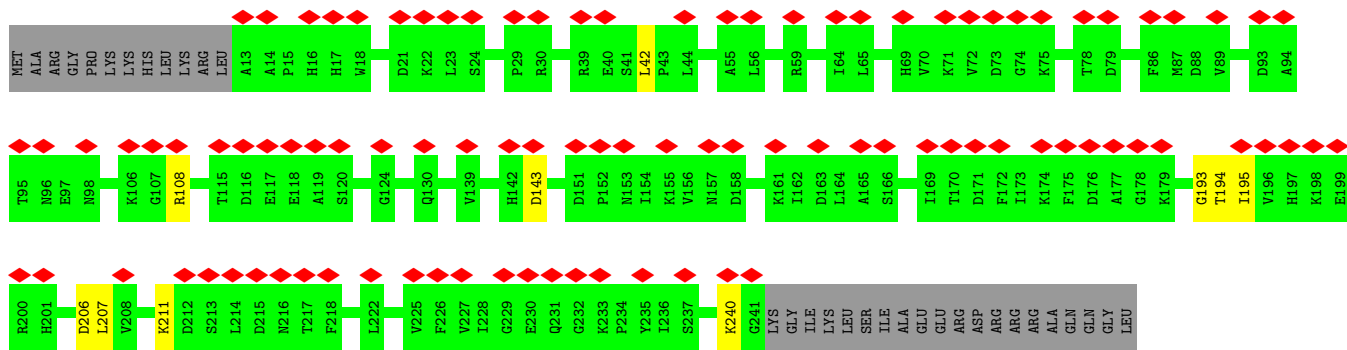
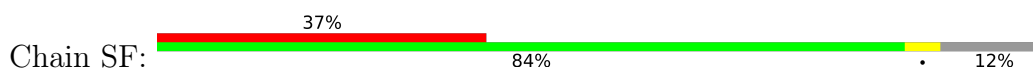




• Molecule 4: 40S ribosomal protein S1-A

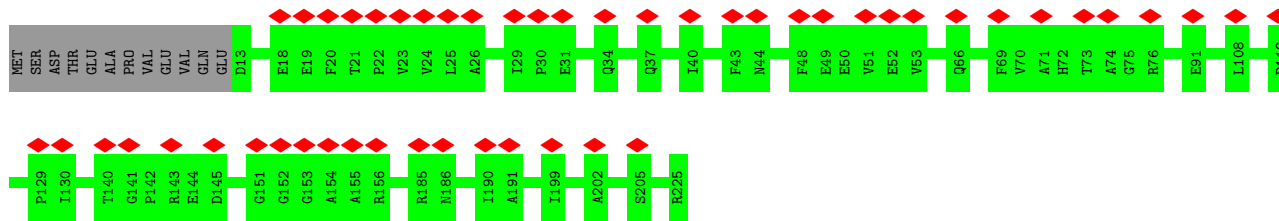


• Molecule 5: 40S ribosomal protein S4-A

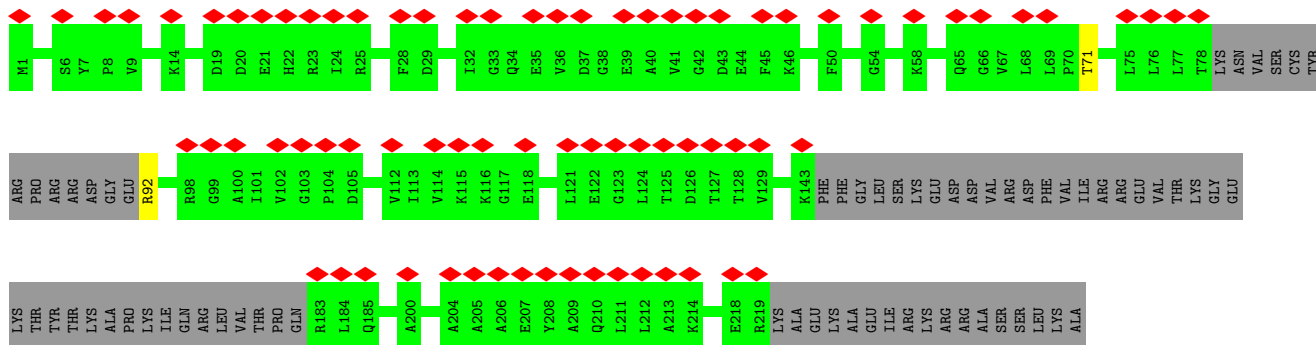


• Molecule 6: 40S ribosomal protein S5

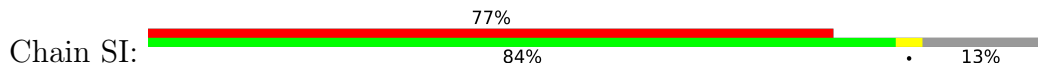




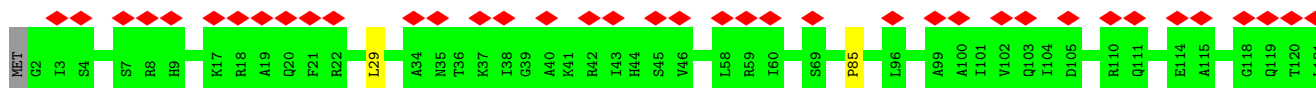
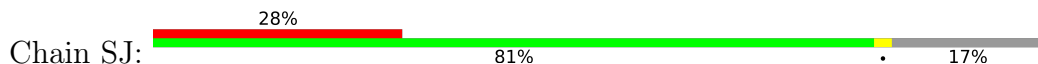
• Molecule 7: 40S ribosomal protein S6-A

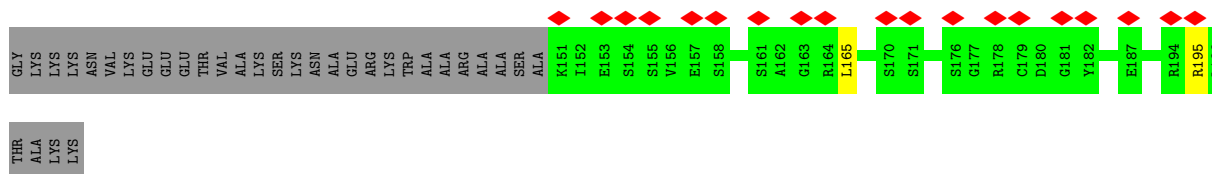


• Molecule 8: 40S ribosomal protein S7-A

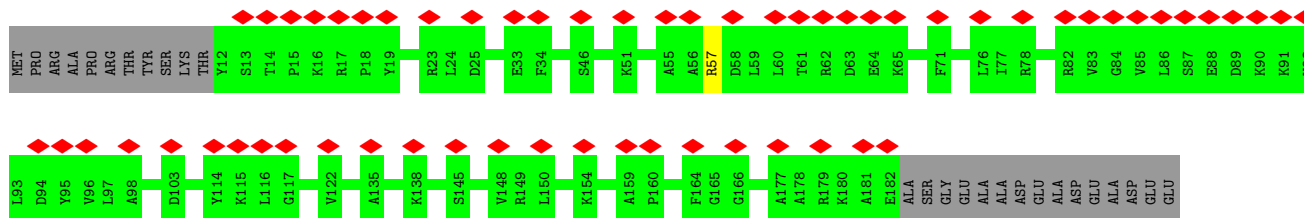
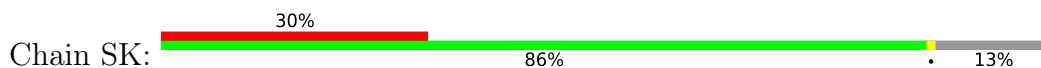


• Molecule 9: 40S ribosomal protein S8-A

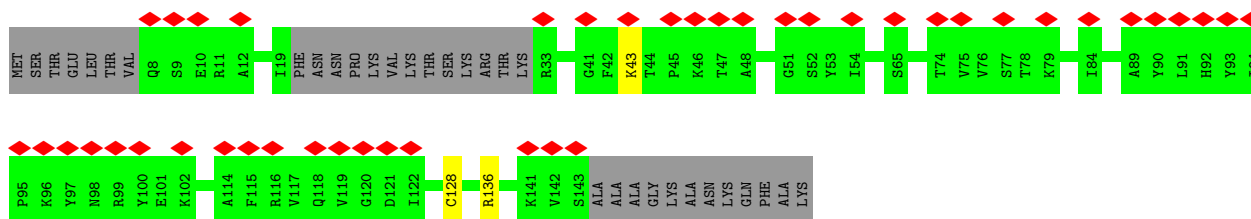
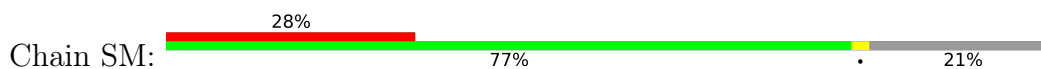




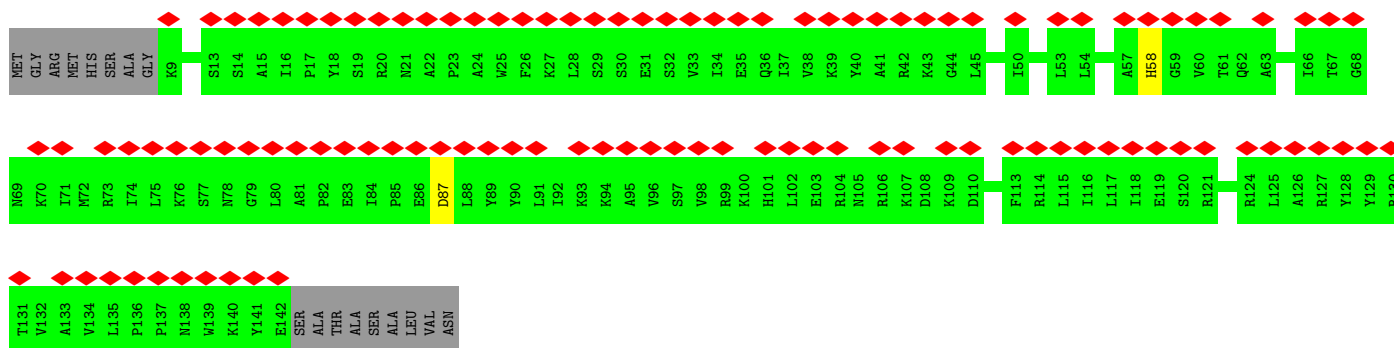
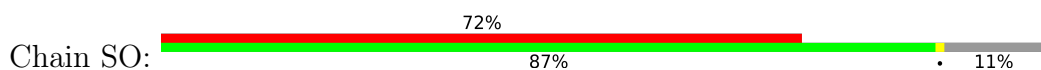
• Molecule 10: 40S ribosomal protein S9-A



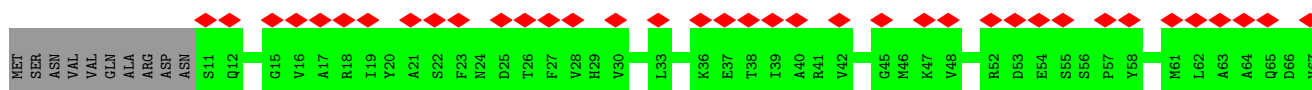
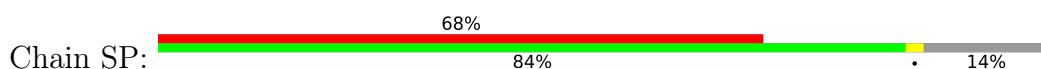
• Molecule 11: 40S ribosomal protein S11-A

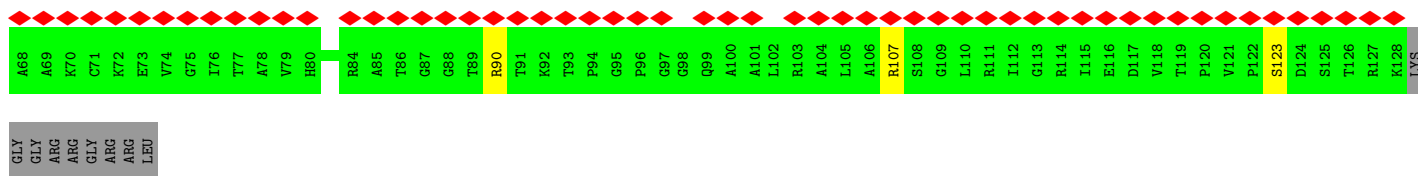


• Molecule 12: 40S ribosomal protein S13

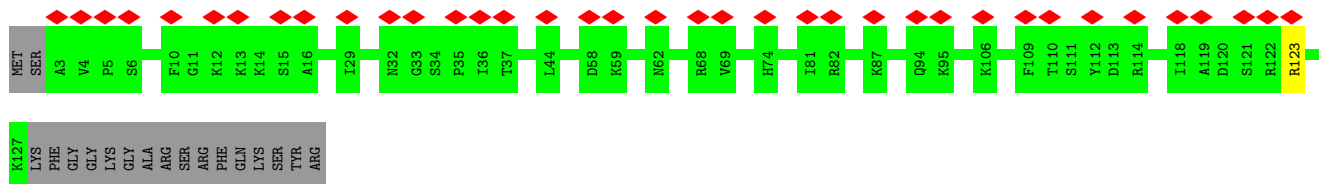
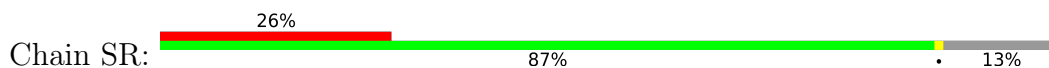


• Molecule 13: 40S ribosomal protein S14-A

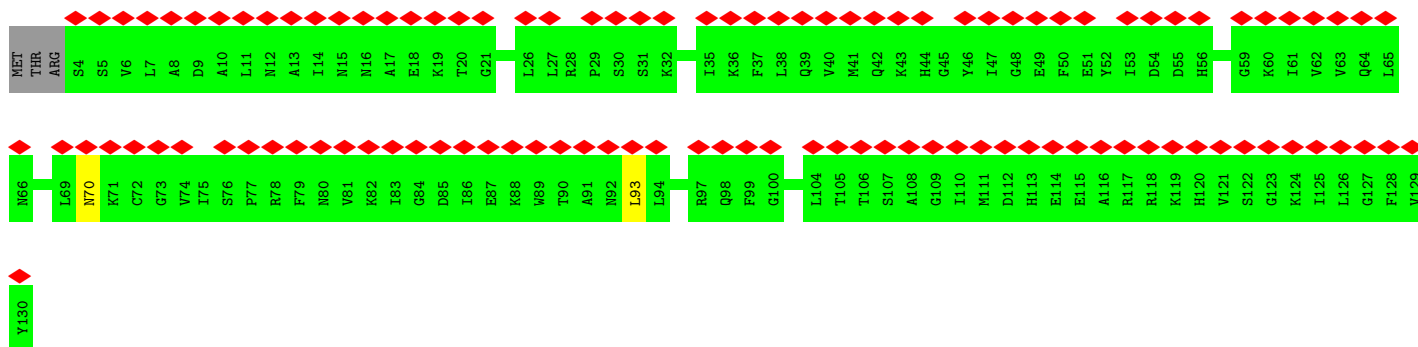
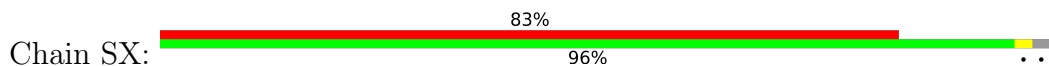




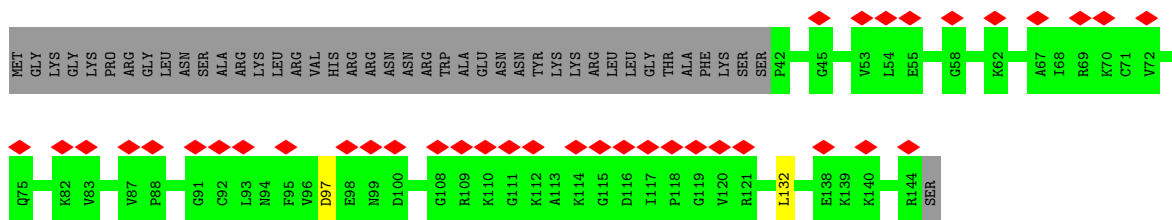
• Molecule 14: 40S ribosomal protein S16-A



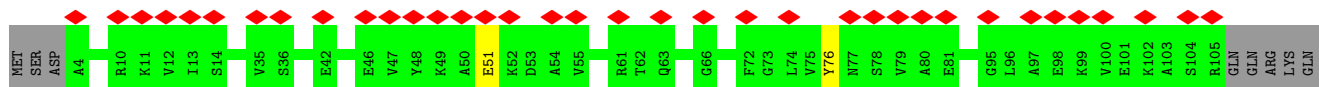
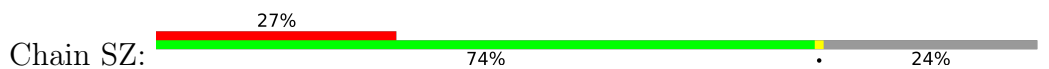
• Molecule 15: 40S ribosomal protein S22-B

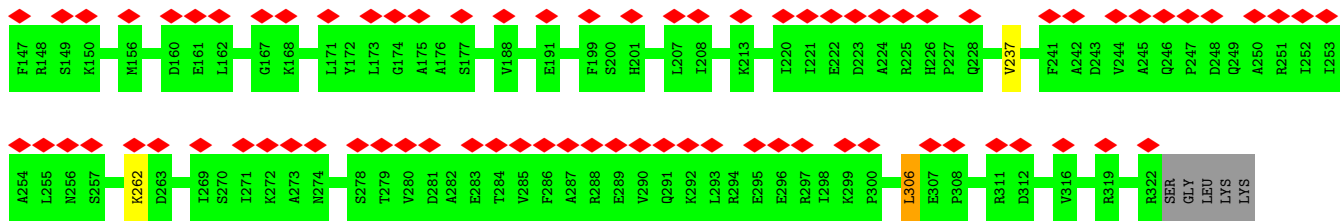


• Molecule 16: 40S ribosomal protein S23-A

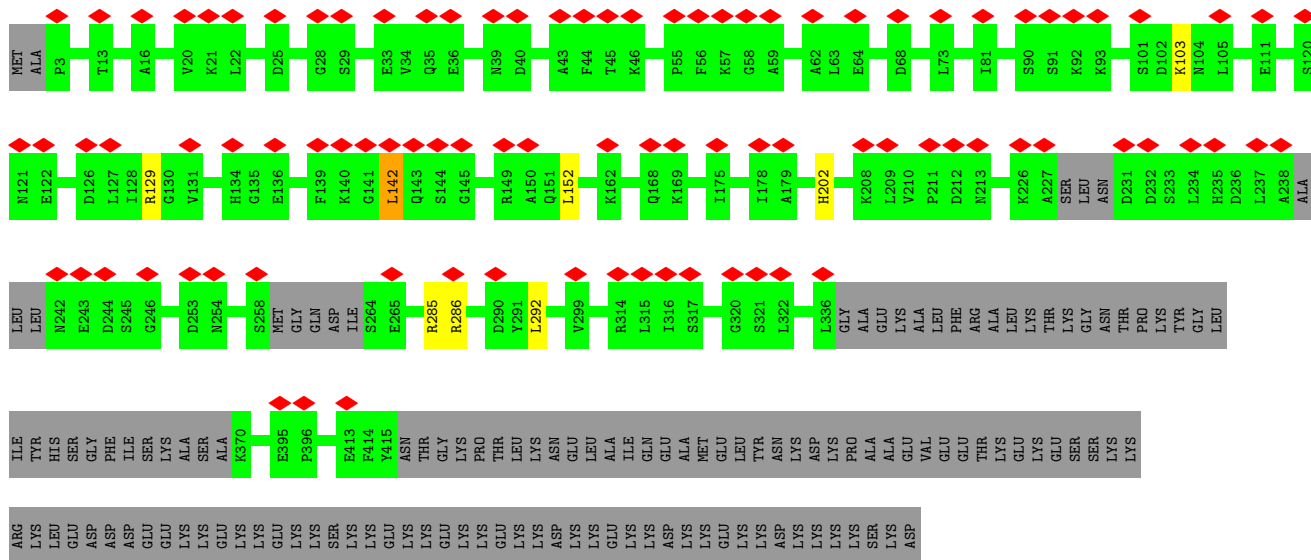
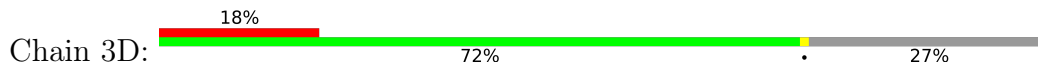


• Molecule 17: 40S ribosomal protein S24-A

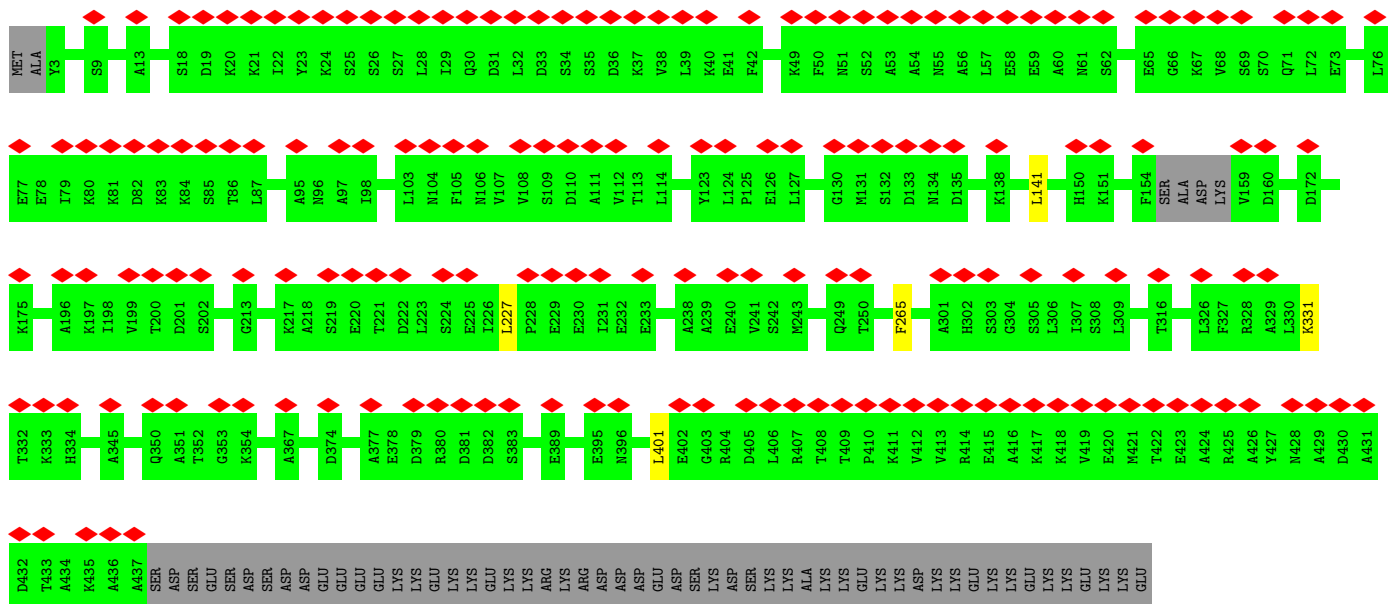
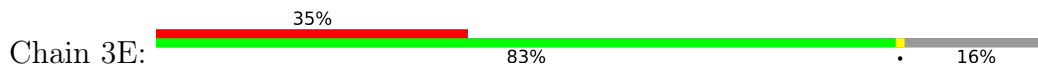


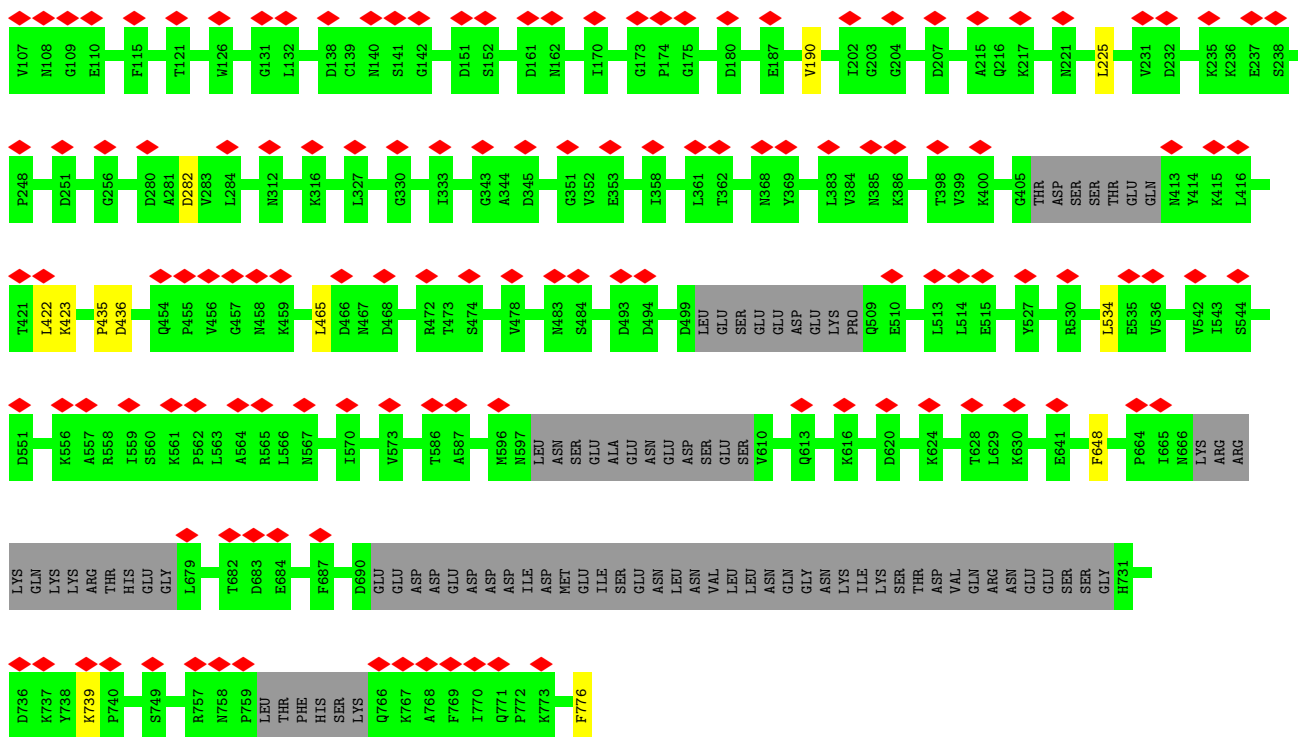


• Molecule 21: Nucleolar protein 56

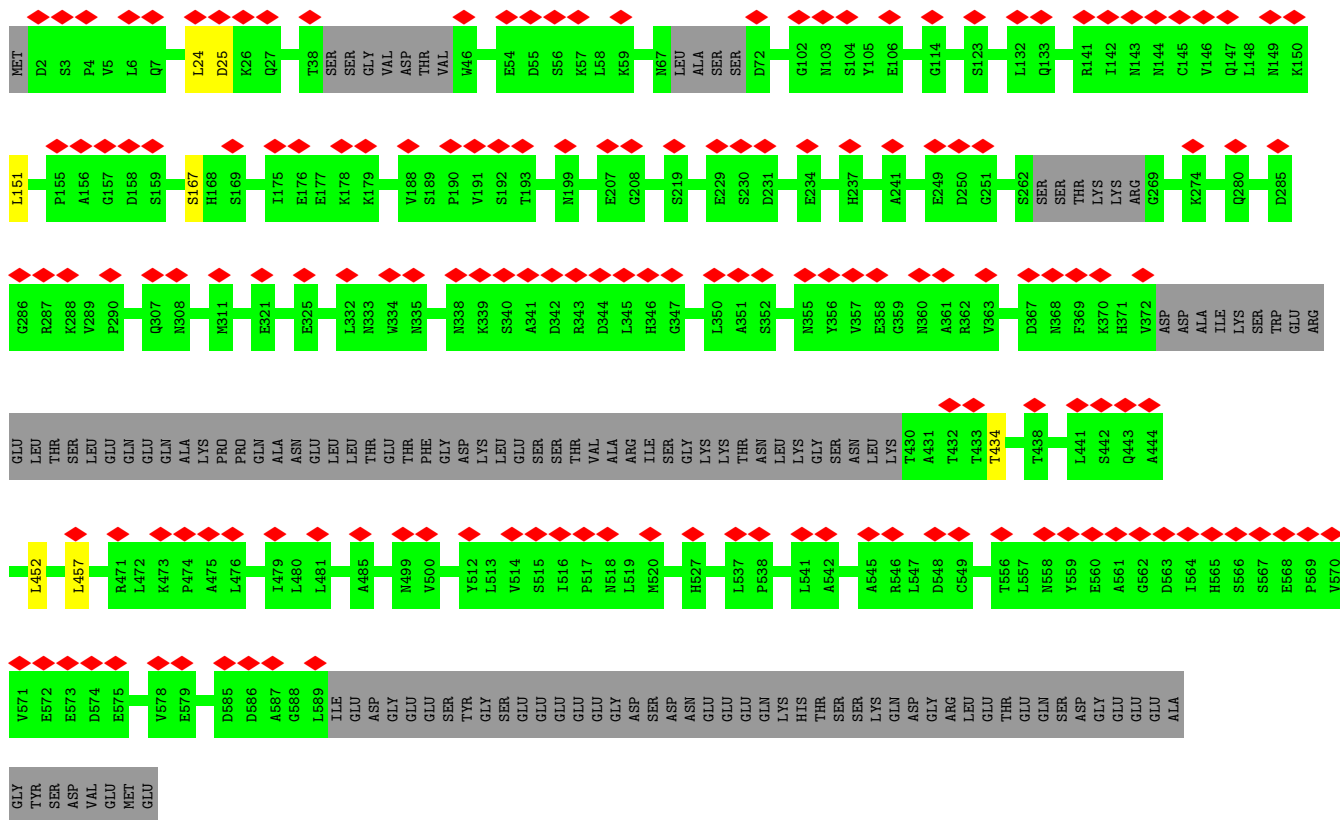
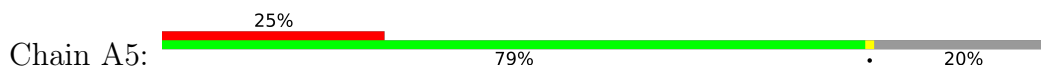


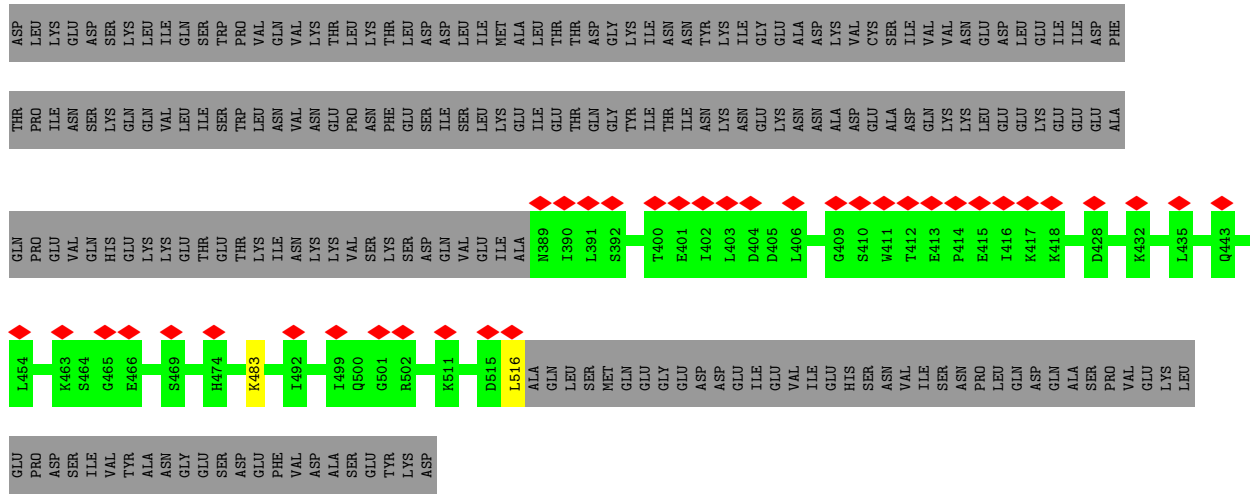
• Molecule 22: Nucleolar protein 58



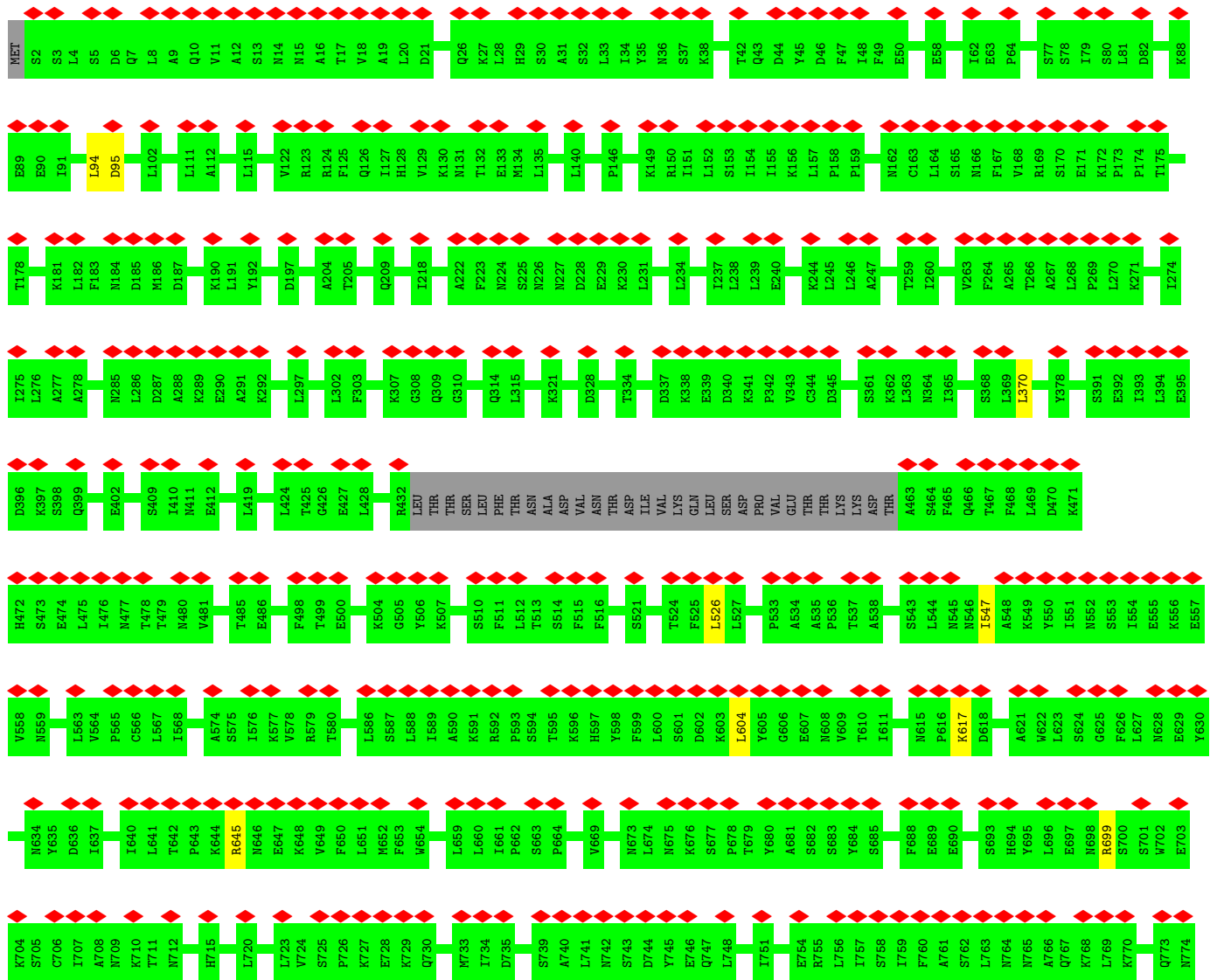
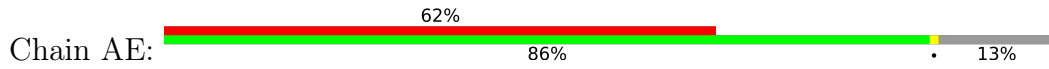


• Molecule 26: U3 small nucleolar RNA-associated protein 5

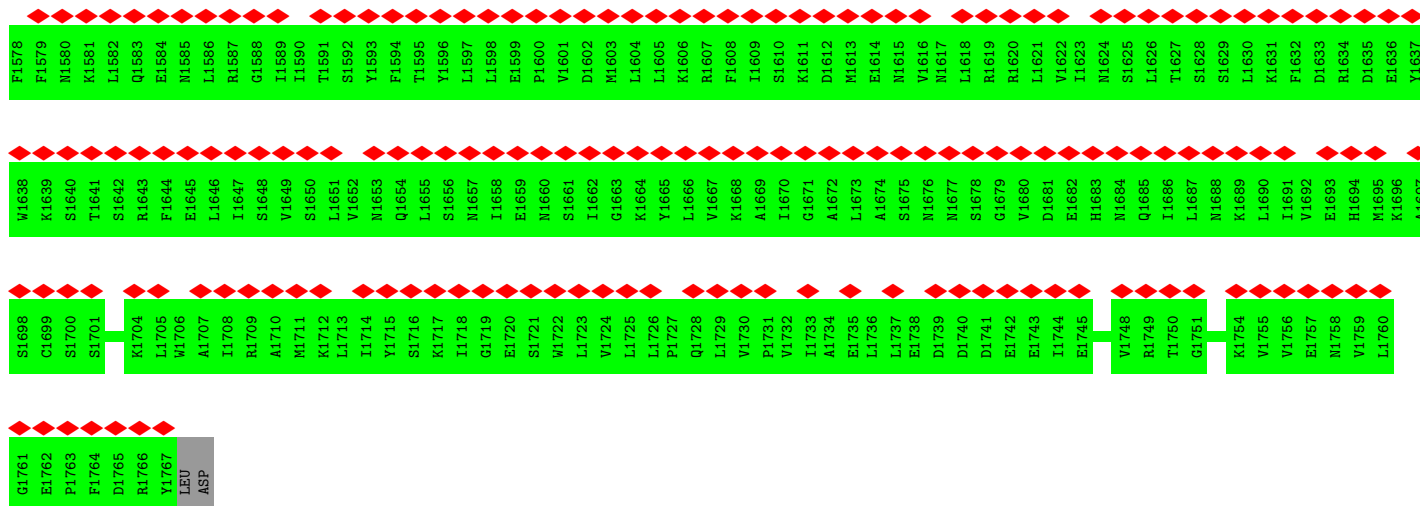




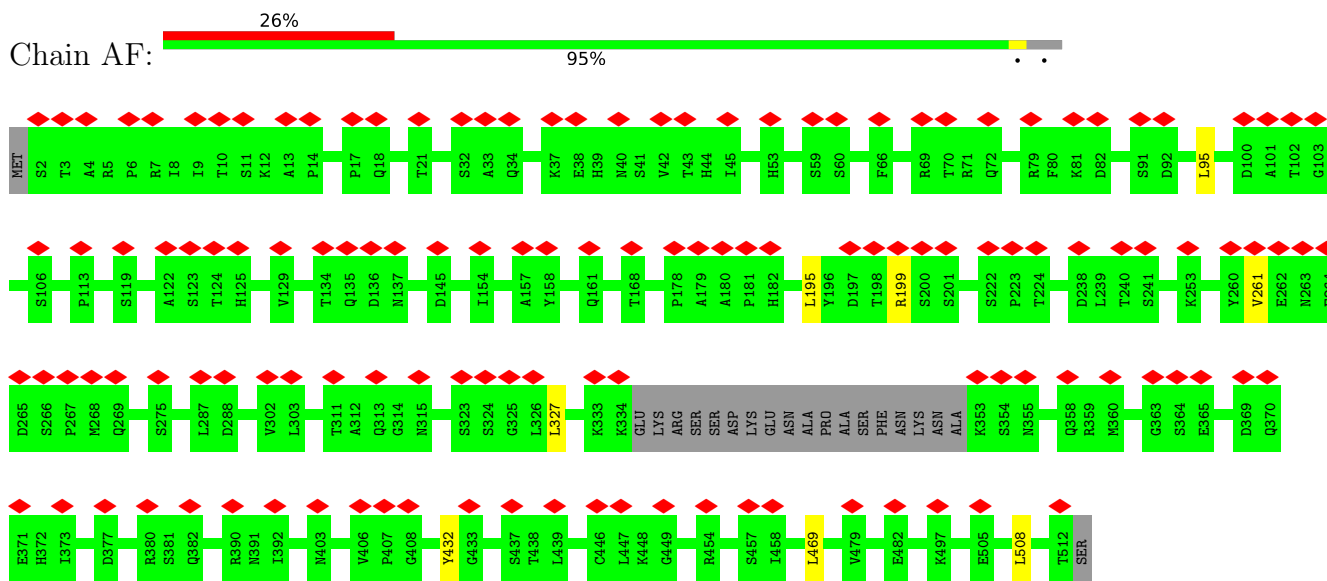
• Molecule 29: U3 small nucleolar RNA-associated protein 10



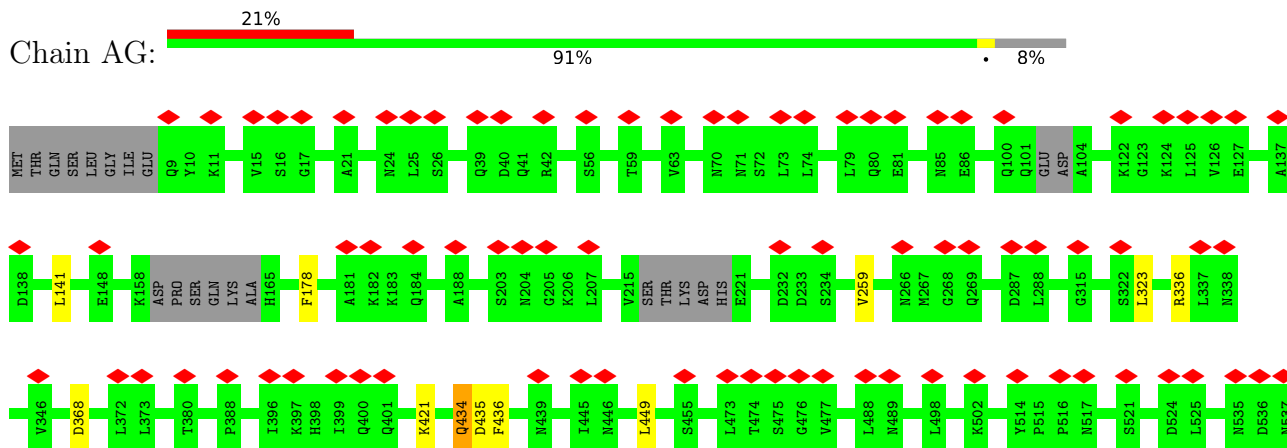
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E839	V840	SER	GLN	GLU	ALA	LEU	LEU	HIS	LEU	ARG	LYS	THR	ILE	ILE	LEU	LEU	A857	L858	D859	R862	N863	V864	V937	S866	E867	K868	LEU	LEU	PHE	THR	LEU	SER	LEU	SER	ASP	GLU	THR	ASP	GLN	THR	ASP	PHE	SER	LYS	ARG	ARG	R827	S828	S829	T830	S831	K832	N833	A834	F835	L836						
L909	K910	E911	H912	G913	C914	V920	R921	ALA	ASP	LYS	THR	ILE	VAL	LEU	SER	THR	ILE	ALA	ARG	ASN	A933	S934	P935	Q936	V937	Q938	N939	K940	L941	L942	L943	V944	I945	G946	S947	L948	ALA	THR	LEU	SER	ASP	GLU	THR	ASP	GLN	THR	ASP	PHE	SER	LYS	ARG	ARG	R827	S828	S829	T830	S831	K832	N833	A834	F835	L836
ARG	GLN	ASP	ASP	GLU	PHE	THR	THR	VAL	VAL	GLU	ARG	THR	ILE	LEU	THR	VAL	P992	A993	L994	I995	K996	S997	S998	K999	G1000	N1001	E1002	K1003	E1004	E1005	M1006	GLU	PHE	LEU	LEU	SER	LEU	THR	THR	THR	ALA	LEU	GLN	H1019	V1020	P1021	R1022	H1023	R1024	R1025	V1026	K1027	L1028	F1029	S1030	T1031	L1032					
ILE	LYS	THR	LEU	ASP	PRO	V1039	K1040	A1041	L1042	G1043	S1044	F1045	L1046	F1047	L1048	I1049	ALA	GLN	L994	T995	SER	SER	ALA	L1057	F1060	K1061	I1062	G1063	E1064	A1065	R1066	I1067	L1068	I1069	E1070	F1071	ILE	LYS	ALA	ALA	LEU	VAL	H1080	V1081	N1082	E1083	E1084	L1085	S1086	G1087	L1088	M1089	D1090	L1091	L1092	D1093						
I1094	I1095	K1096	L1097	L1098	T1099	S1100	S1101	K1102	S1103	S1104	S1105	K1107	K1108	K1109	S1110	L1111	E1112	S1113	R1114	VAL	LEU	PHE	ASN	GLY	VAL	LEU	ASN	LEU	ASN	PHE	THR	GLU	PHE	LEU	THR	THR	PHE	ASN	ASN	THR	THR	PHE	GLU	PHE	ASN	LYS	THR	GLU	THR	ASP	GLN	D1150	Y1151	Y1152	D1153							
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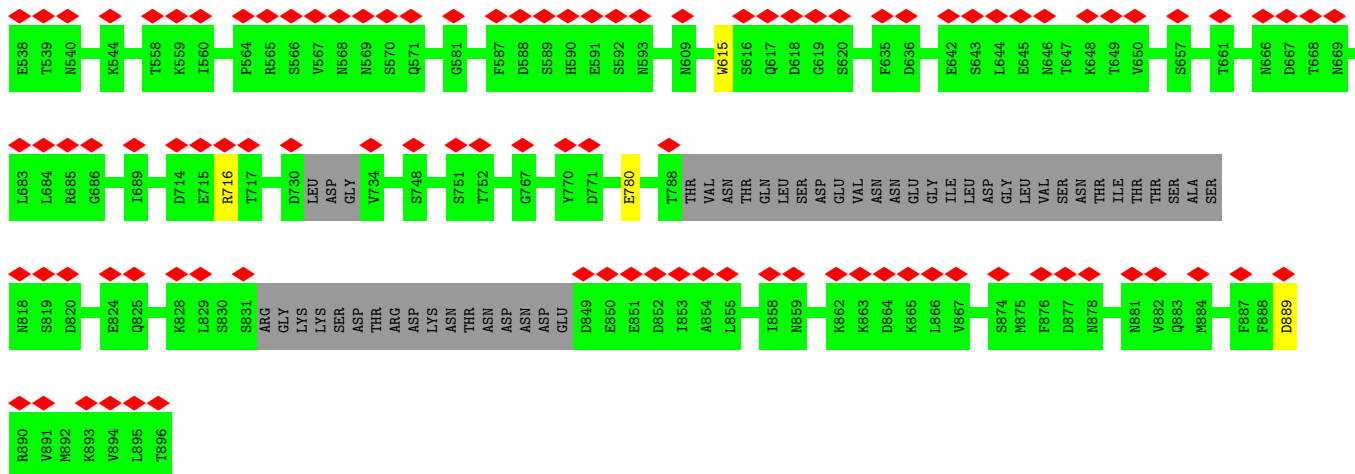


• Molecule 30: U3 small nucleolar RNA-associated protein 15

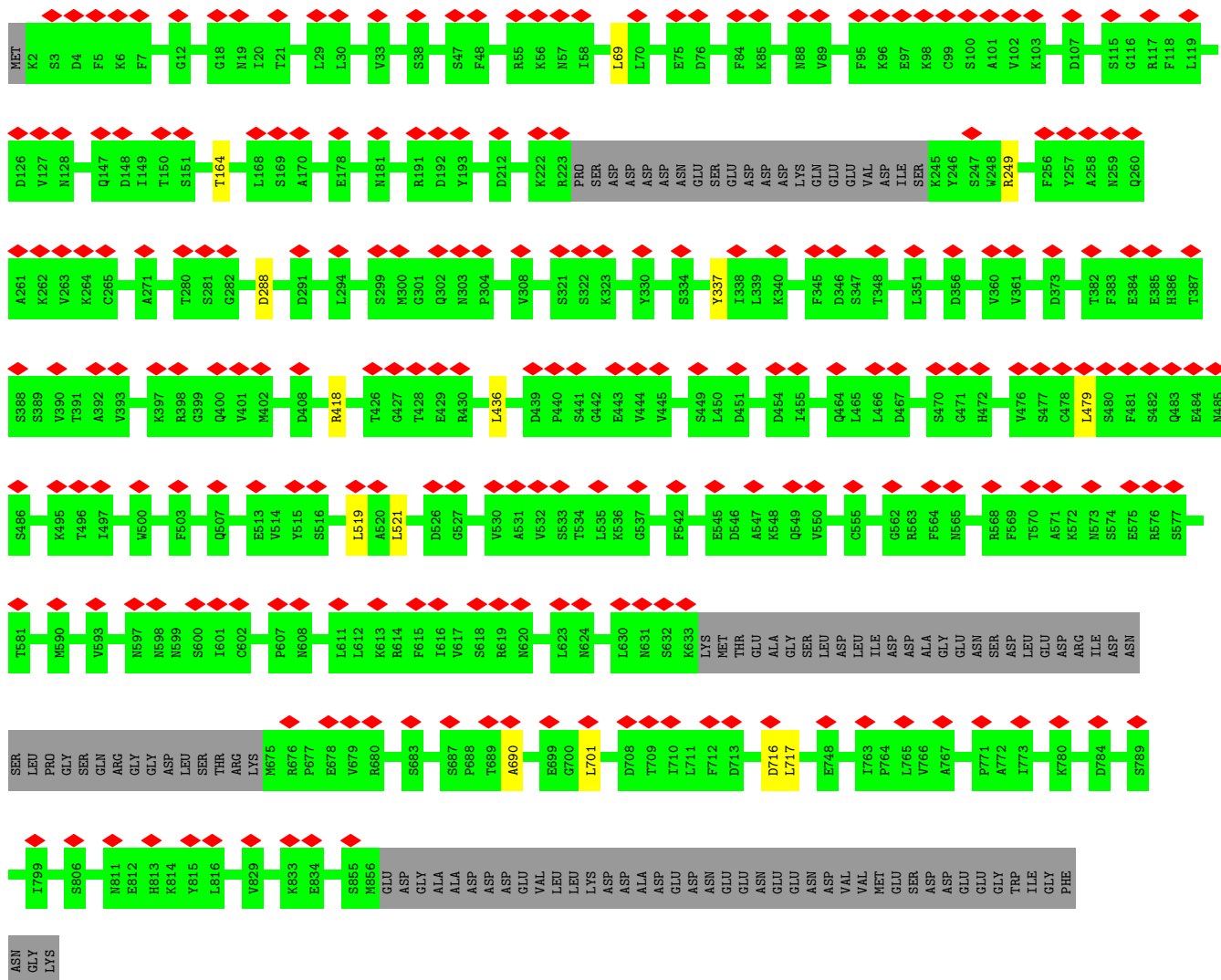
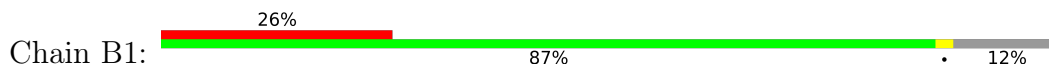


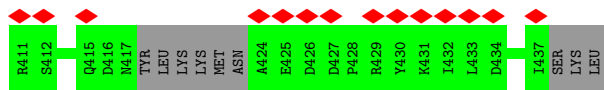
• Molecule 31: NET1-associated nuclear protein 1



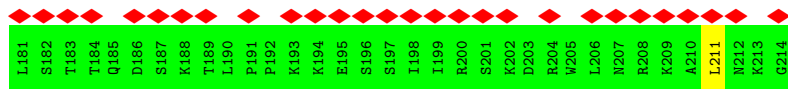
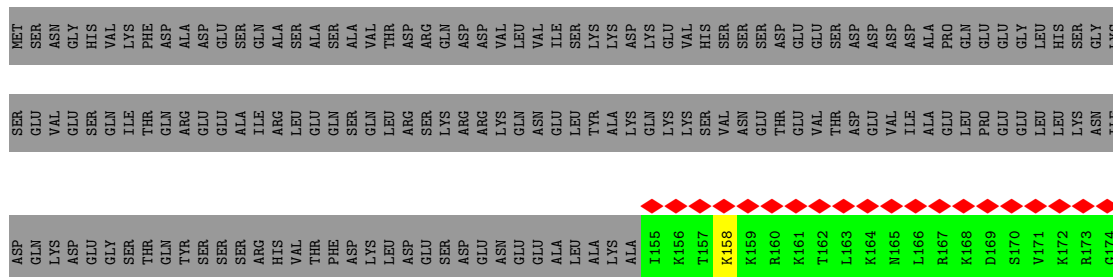


- Molecule 32: Periodic tryptophan protein 2

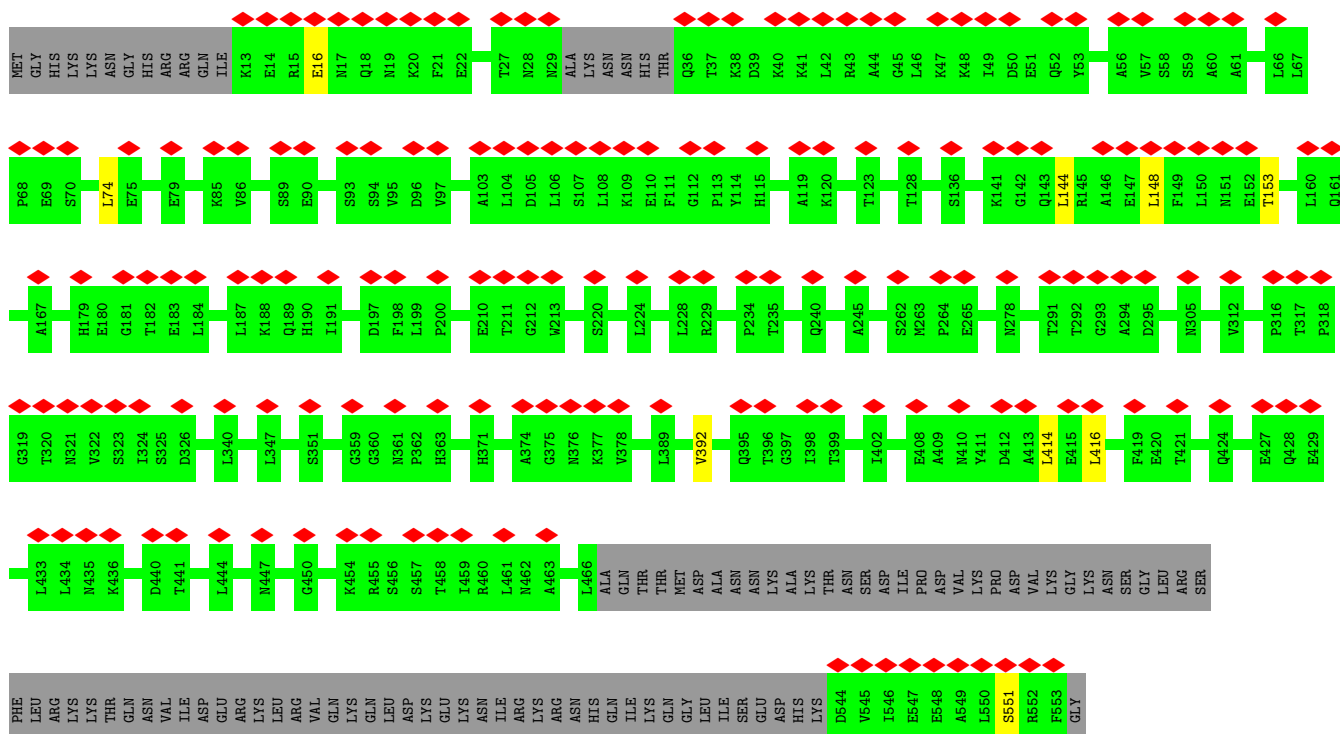
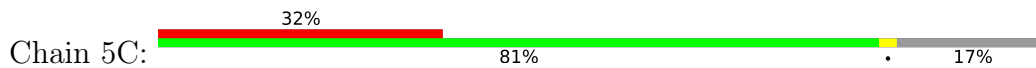




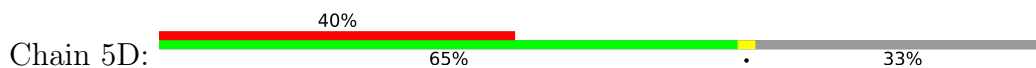
• Molecule 38: Bud site selection protein 21

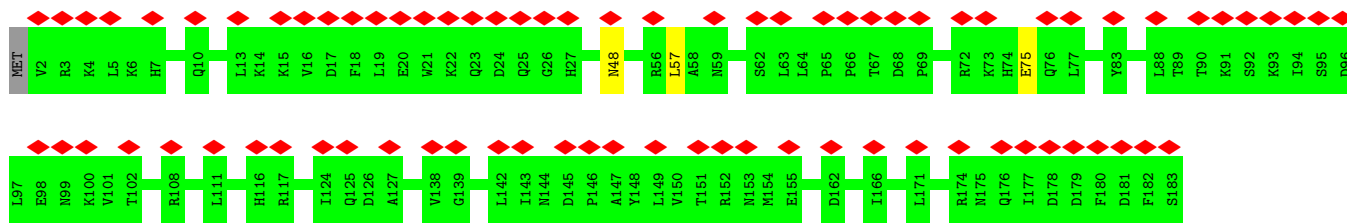


• Molecule 39: U3 small nucleolar RNA-associated protein 7

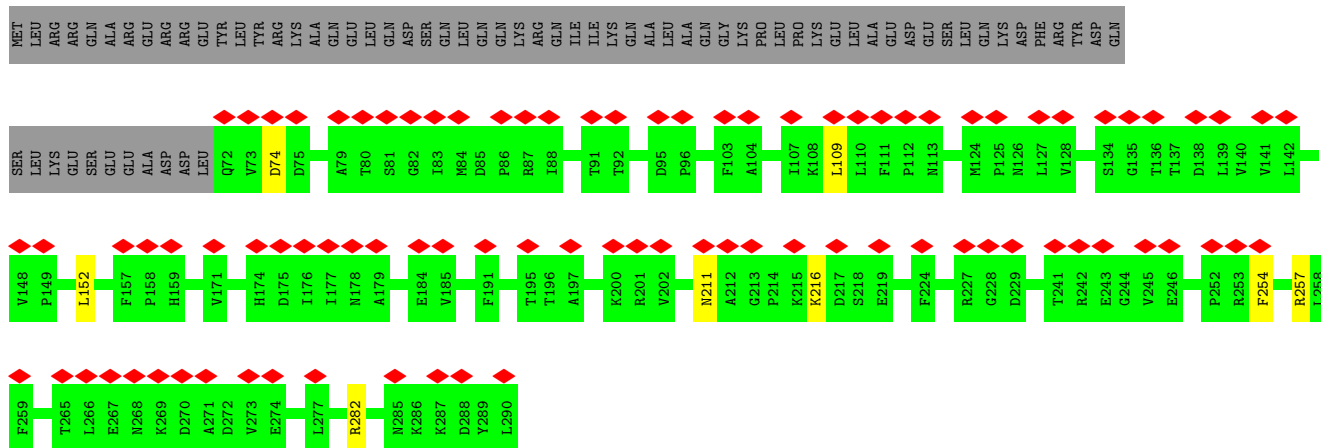
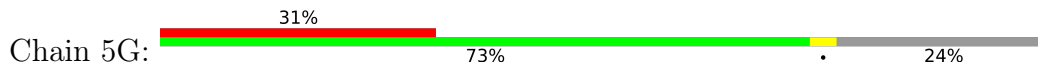


• Molecule 40: U3 small nucleolar RNA-associated protein 11

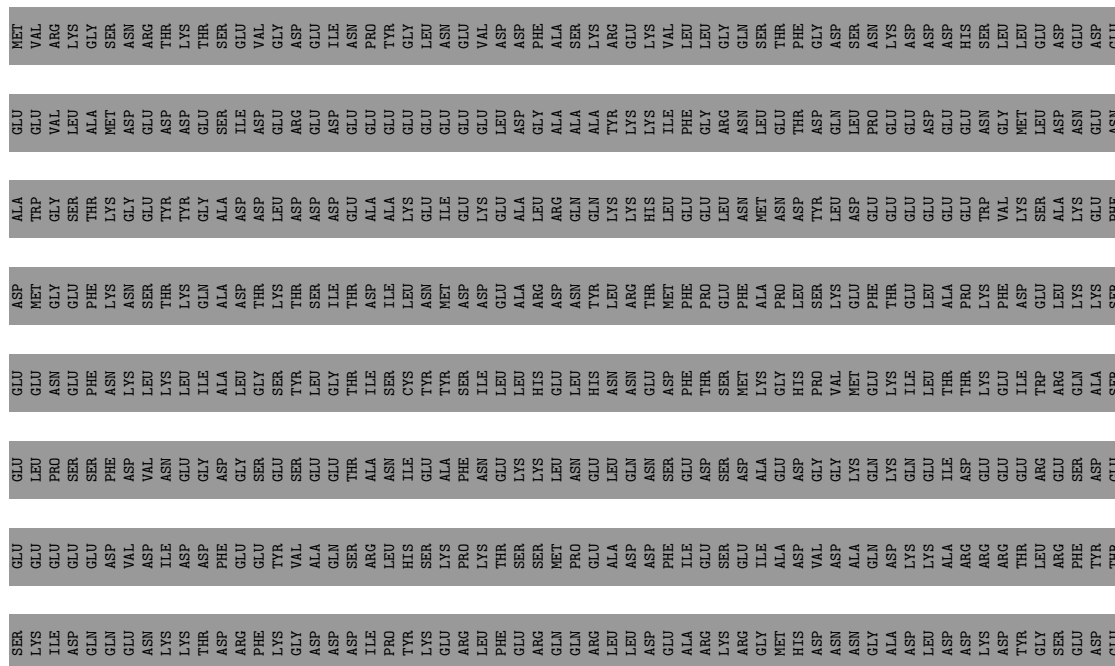


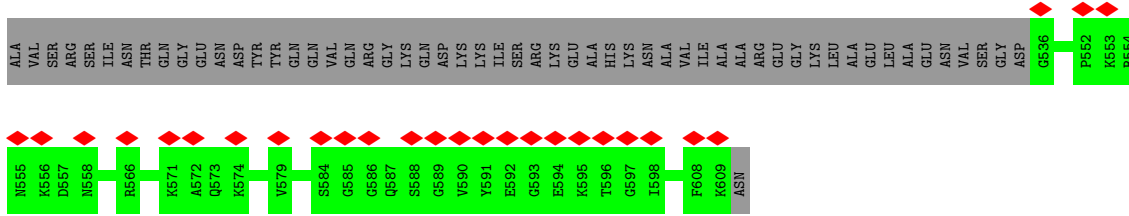


• Molecule 43: U3 small nucleolar ribonucleoprotein protein IMP4

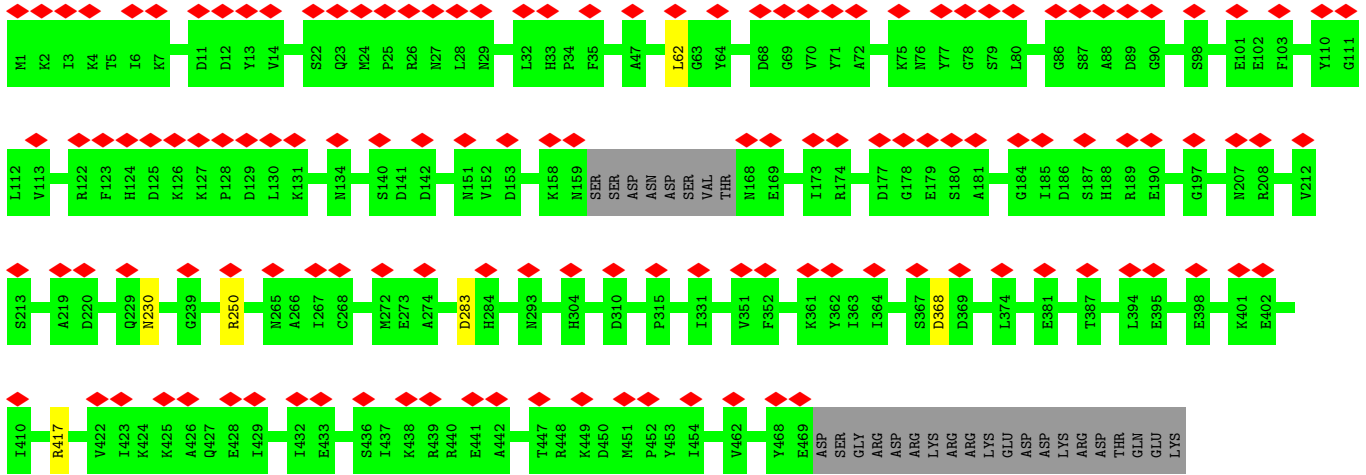
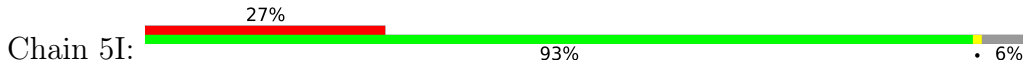


• Molecule 44: Something about silencing protein 10

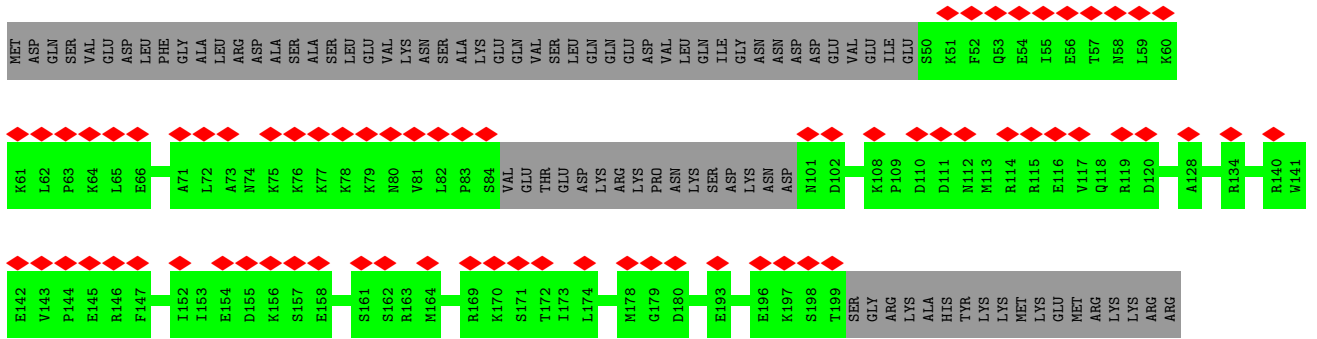




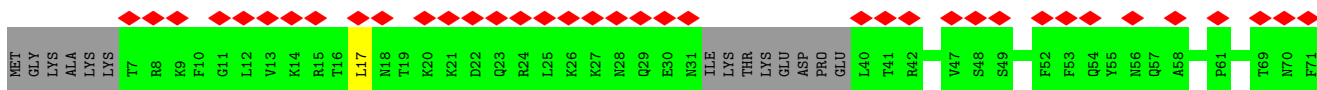
• Molecule 45: Protein SOF1

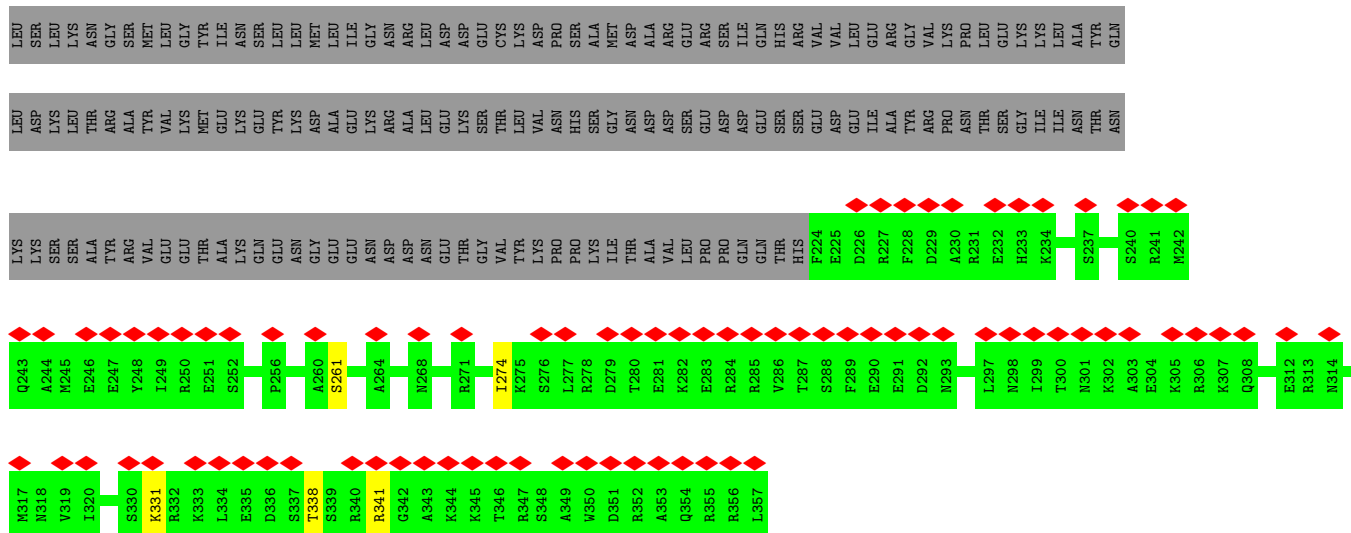


• Molecule 46: rRNA-processing protein FCF2

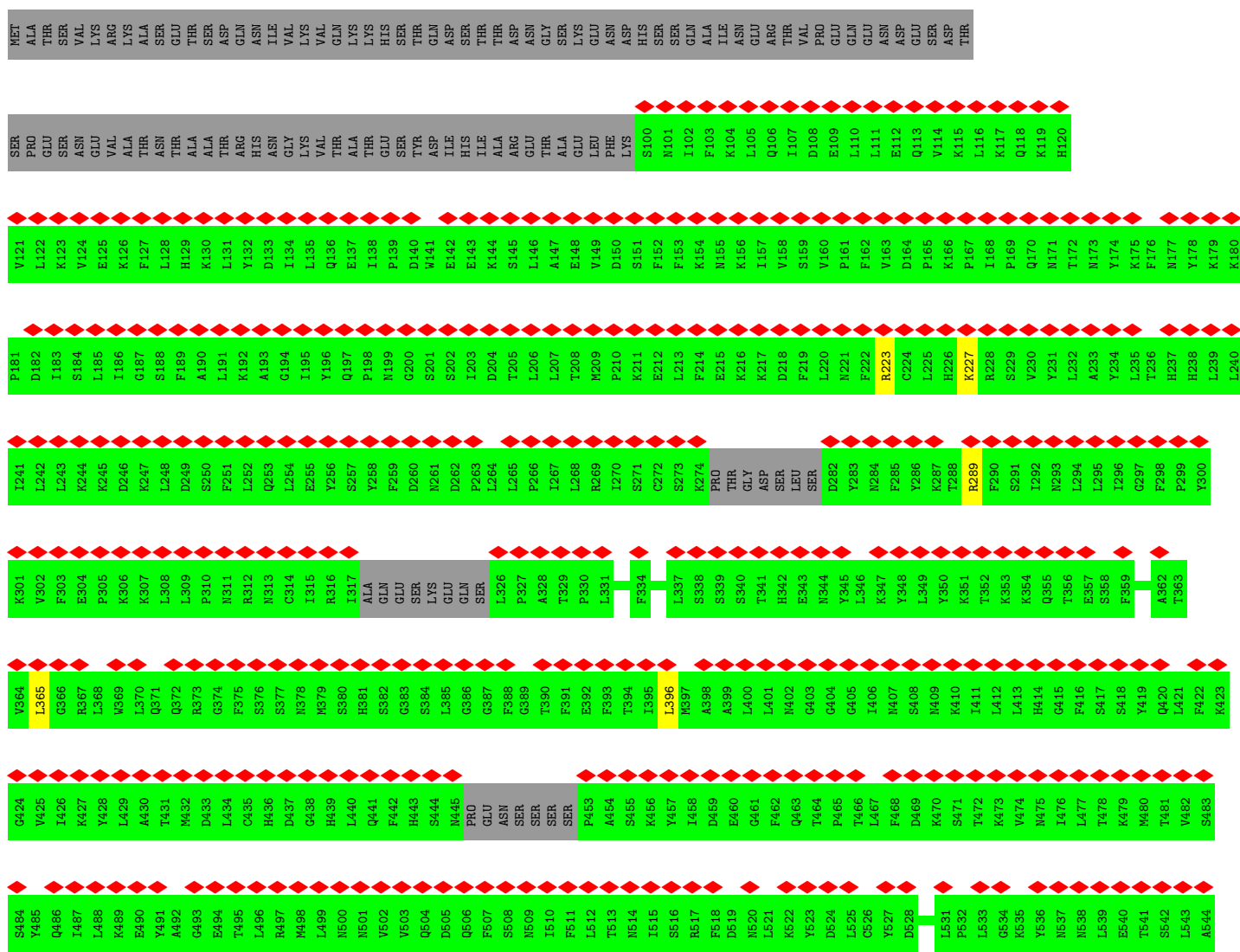
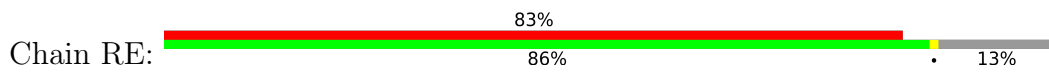


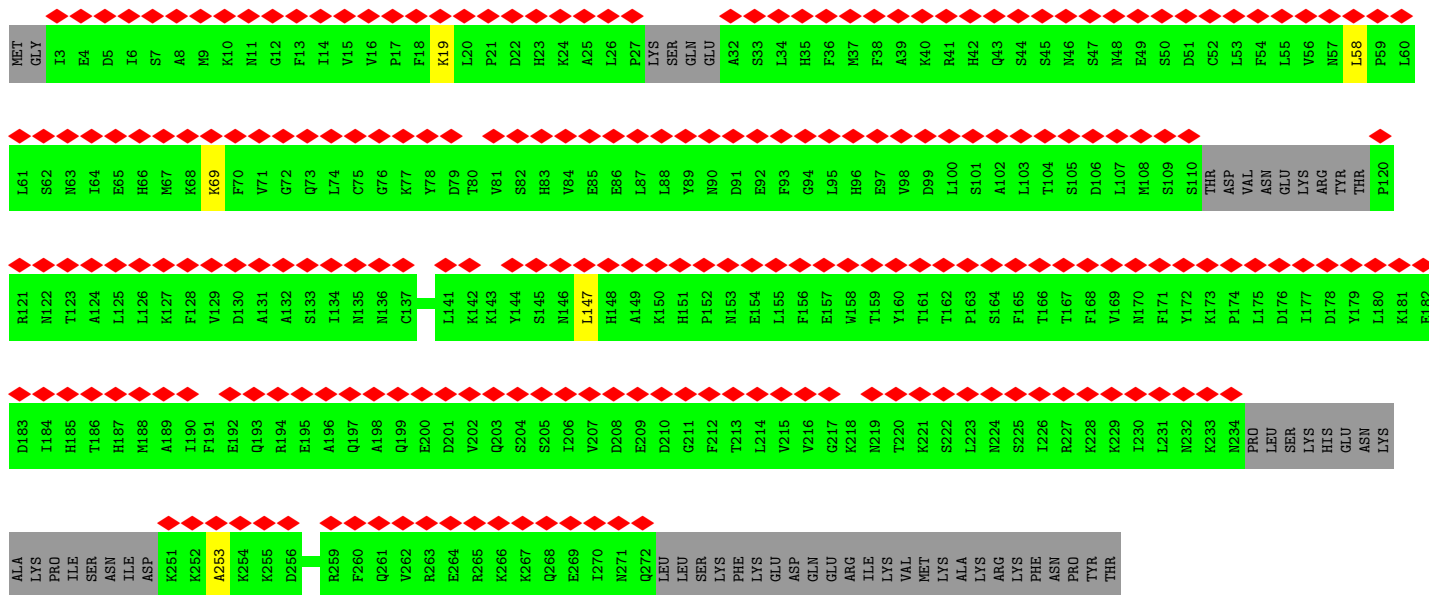
• Molecule 47: rRNA-processing protein FCF1



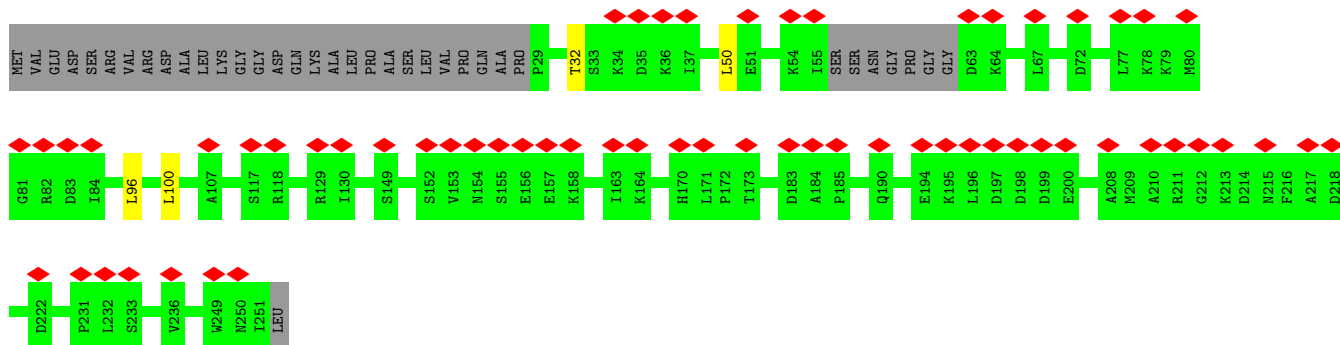
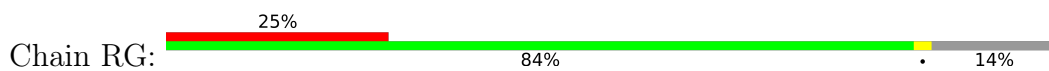


• Molecule 50: U3 small nucleolar RNA-associated protein 22

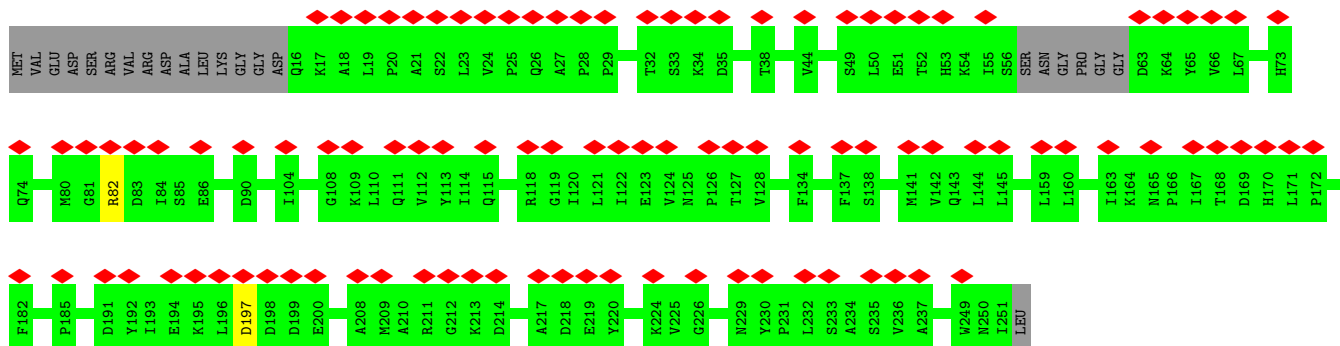
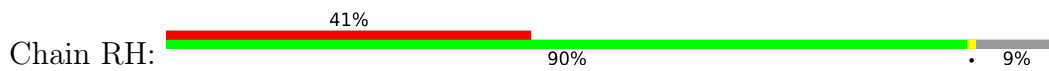




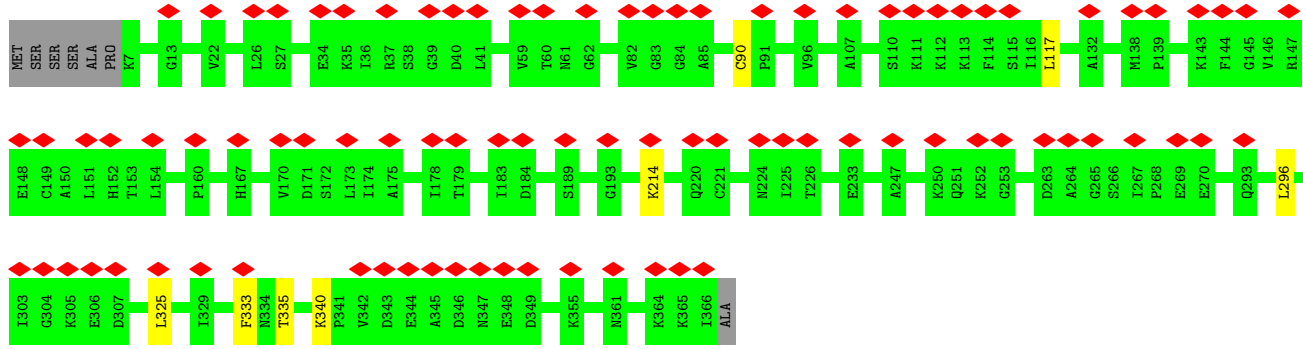
• Molecule 52: Ribosomal RNA small subunit methyltransferase NEP1



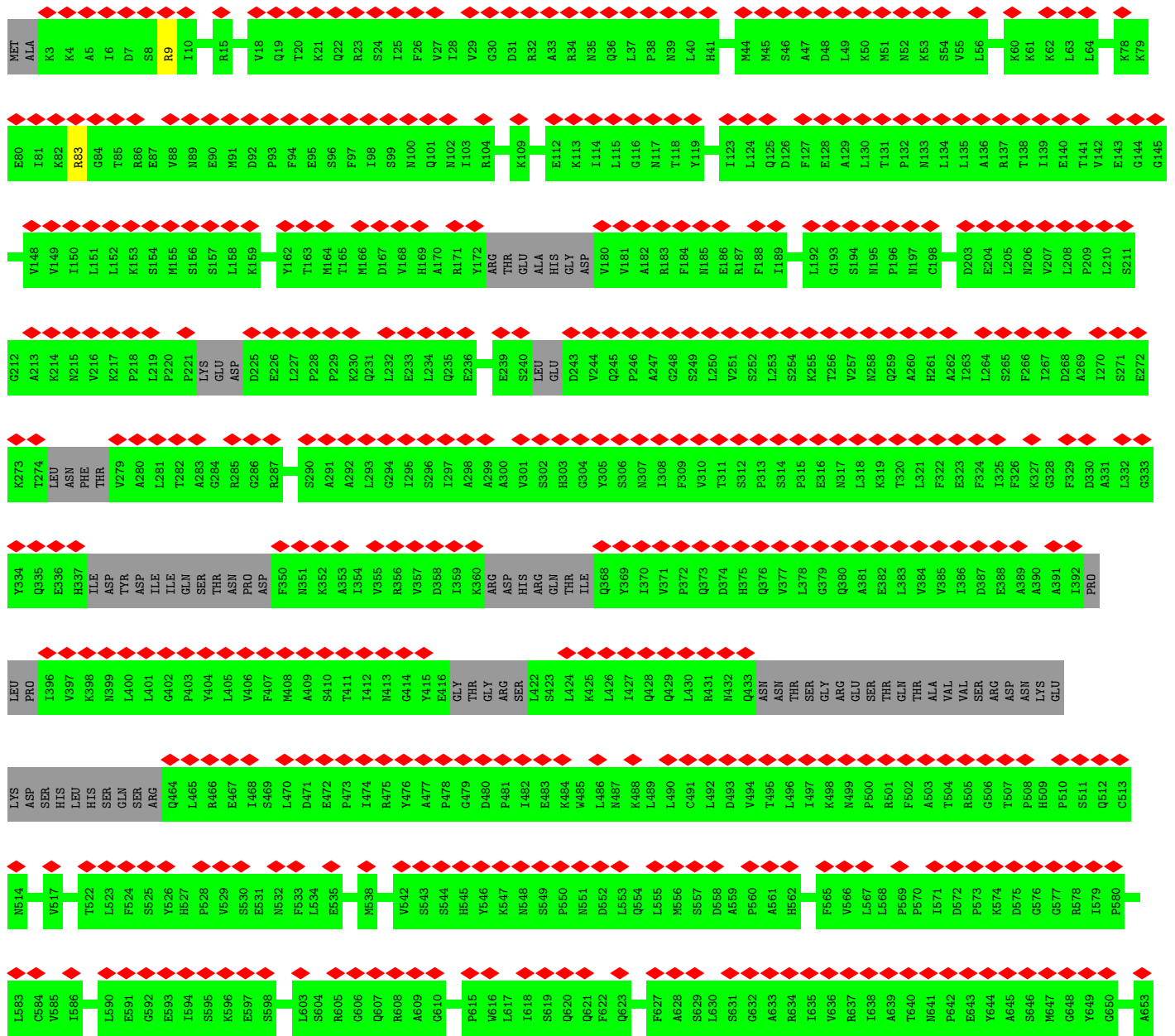
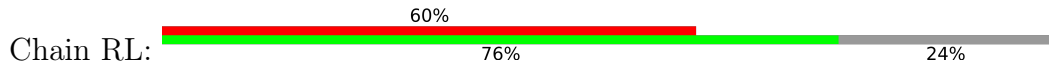
• Molecule 52: Ribosomal RNA small subunit methyltransferase NEP1

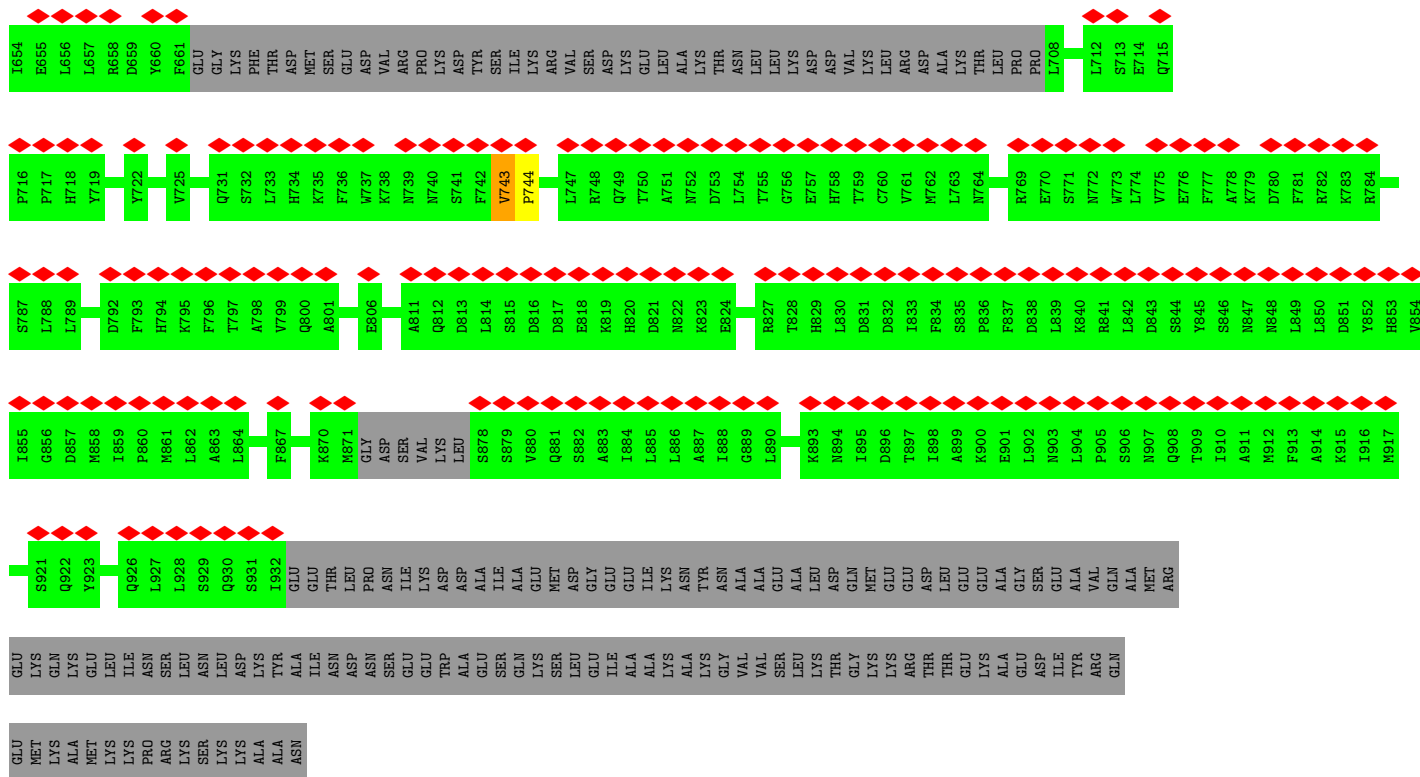


• Molecule 53: Ribosome biogenesis protein BMS1

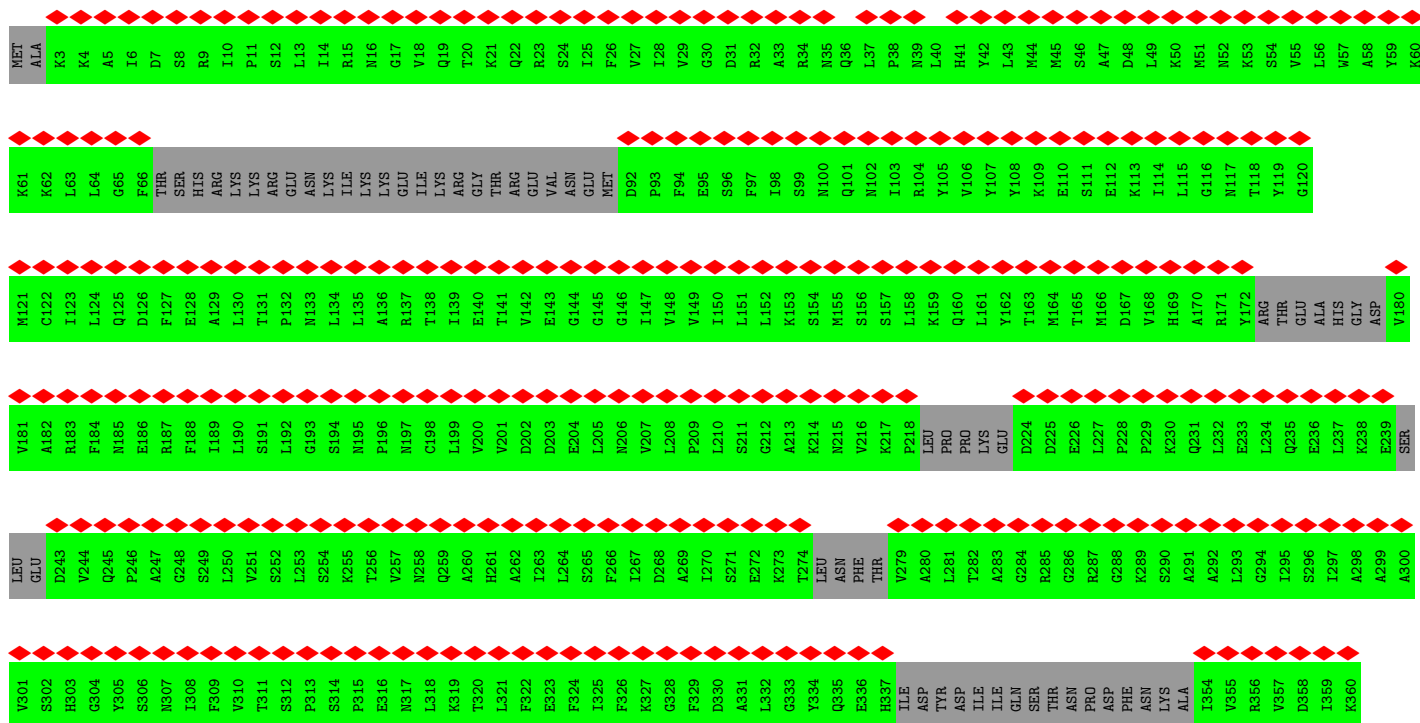
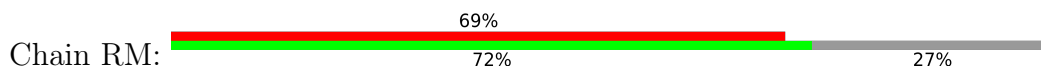


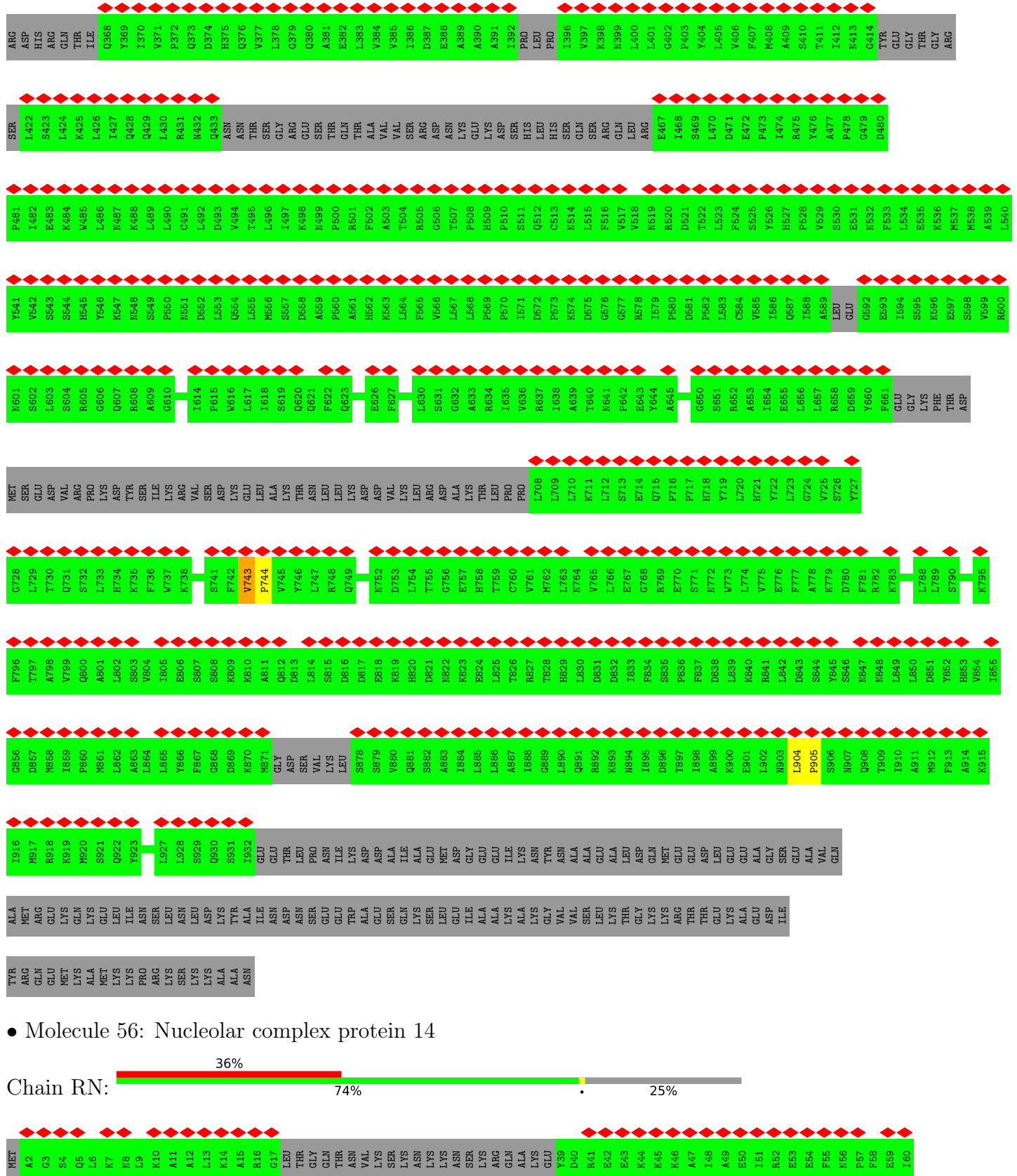
• Molecule 55: RNA cytidine acetyltransferase

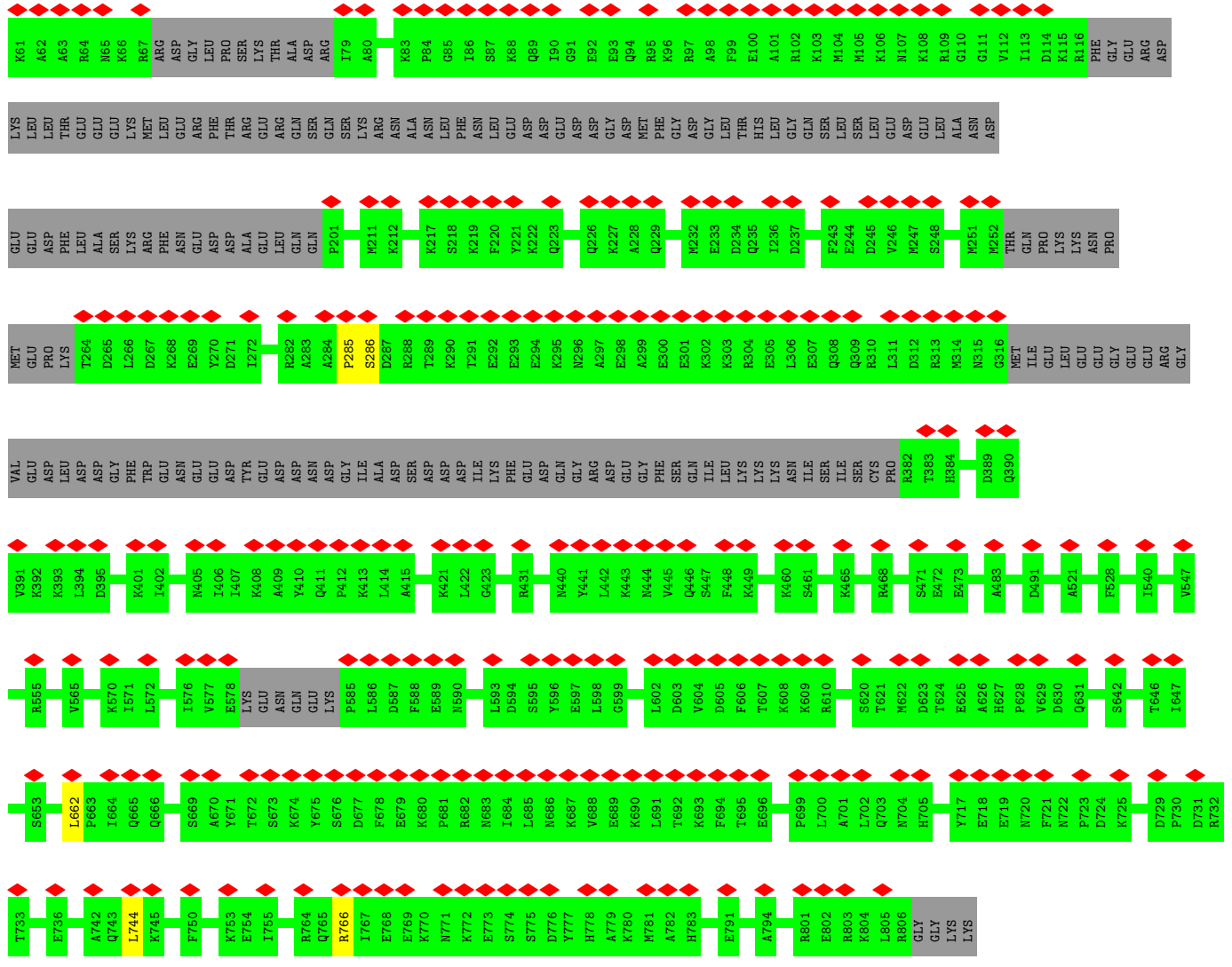




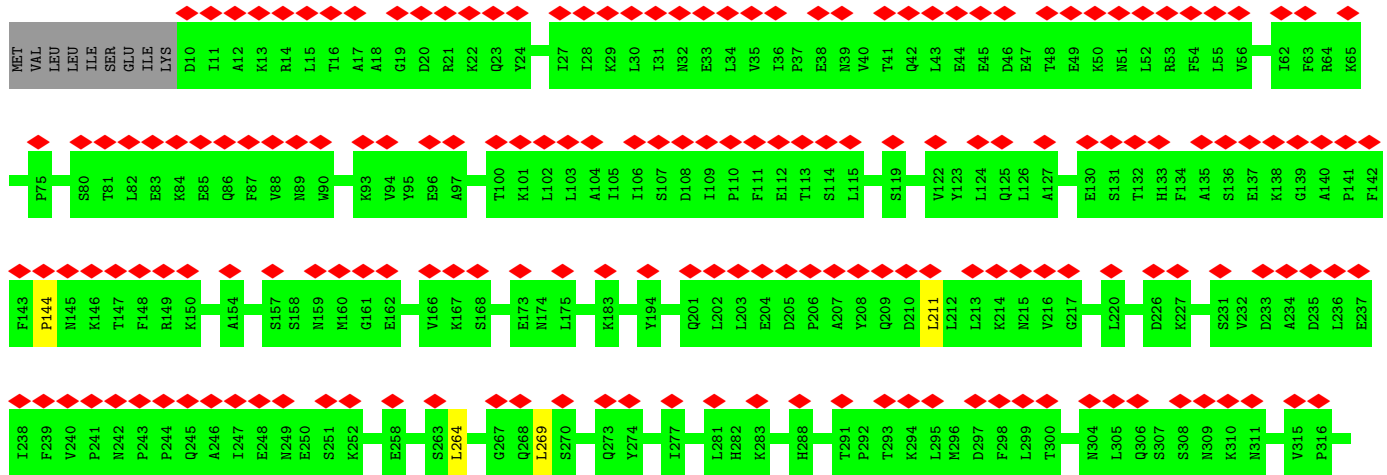
- Molecule 55: RNA cytidine acetyltransferase

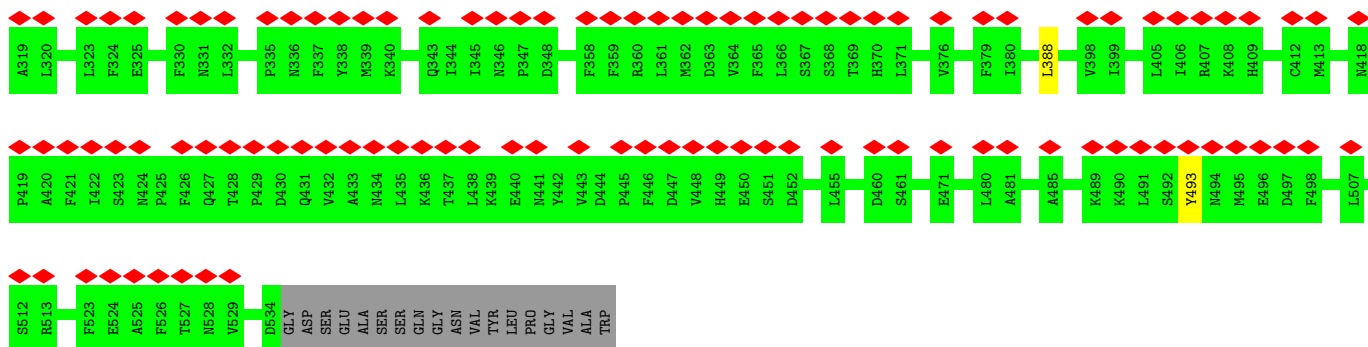




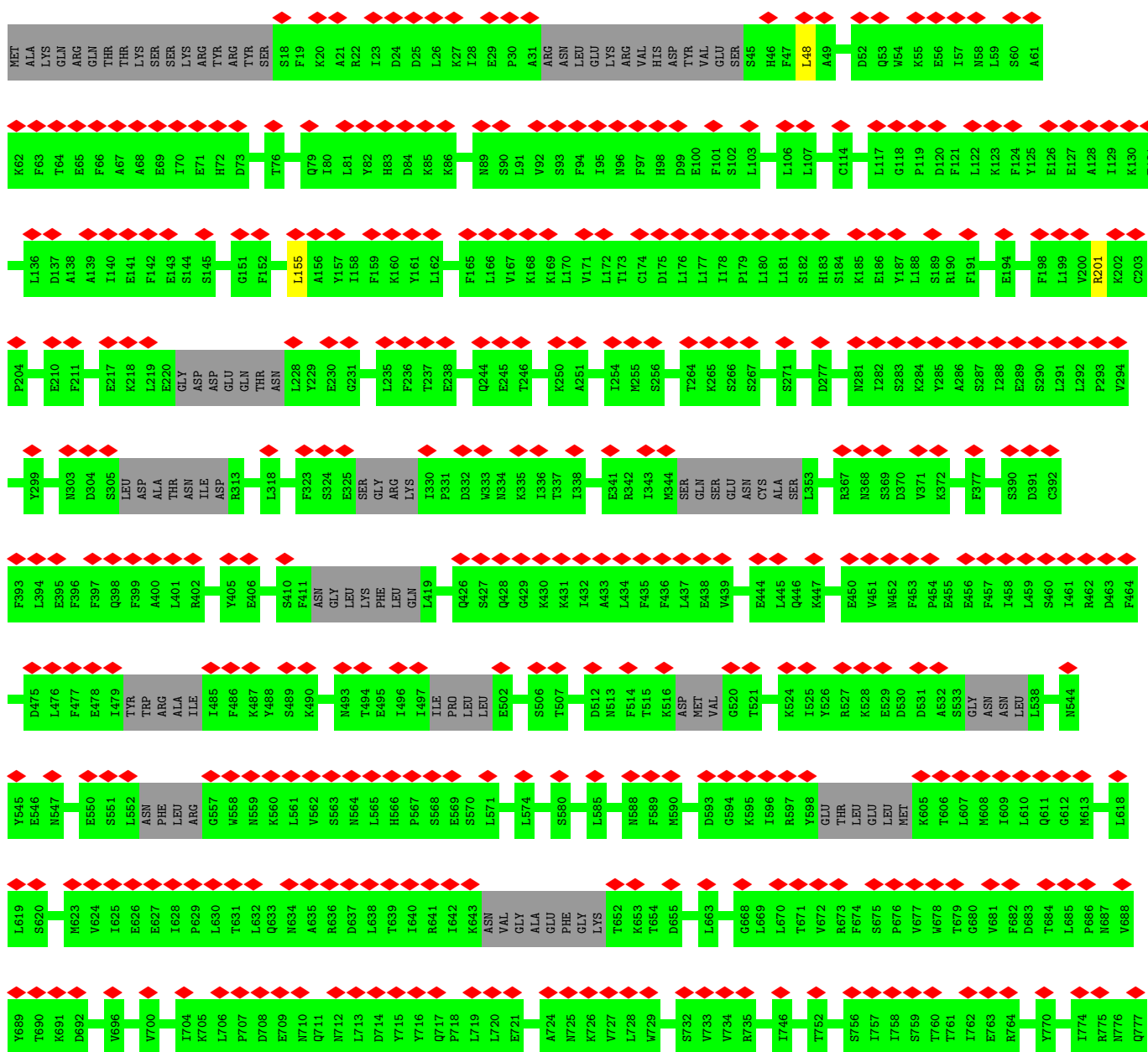
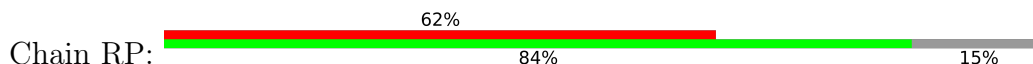


• Molecule 57: Nucleolar complex protein 4





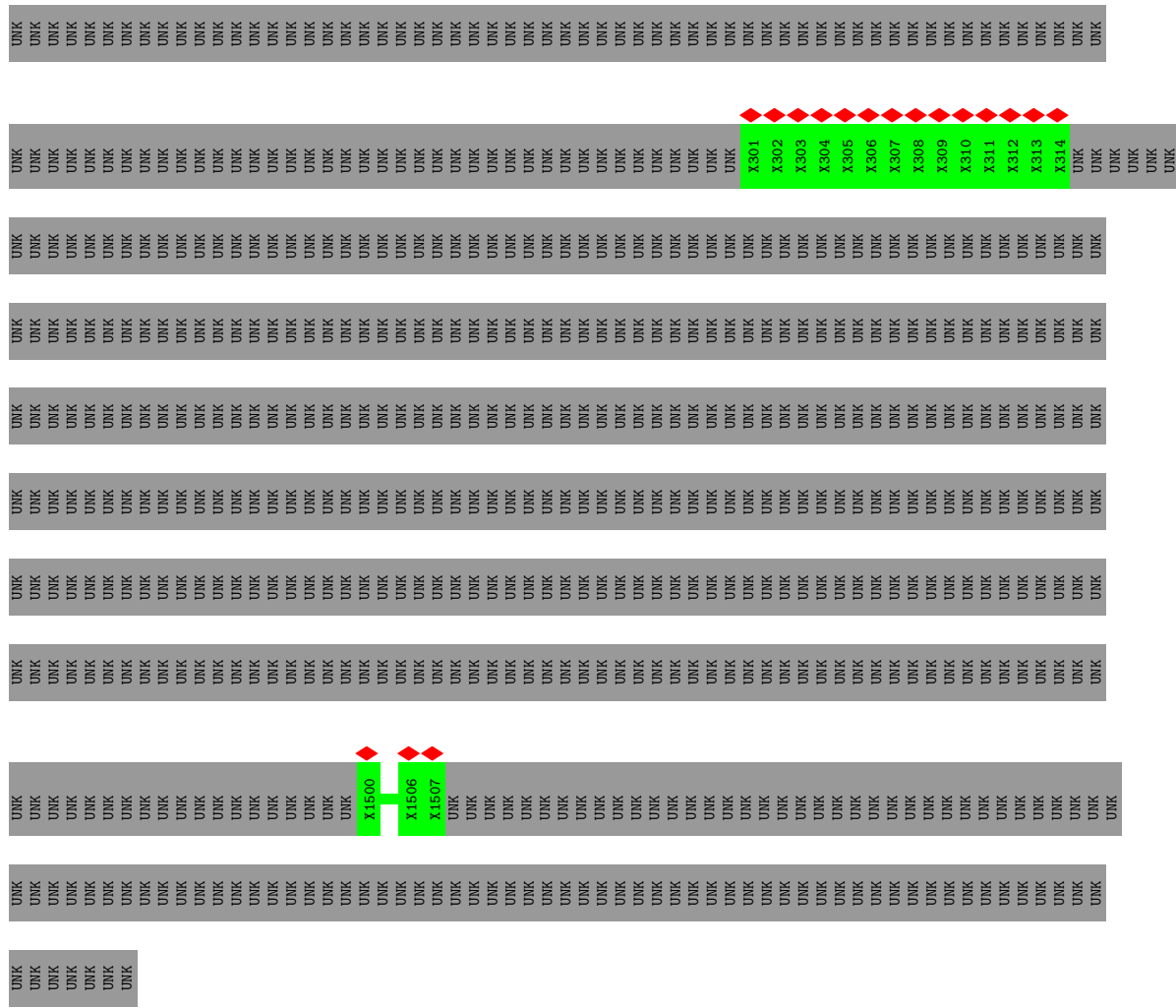
• Molecule 58: U3 small nucleolar RNA-associated protein 20



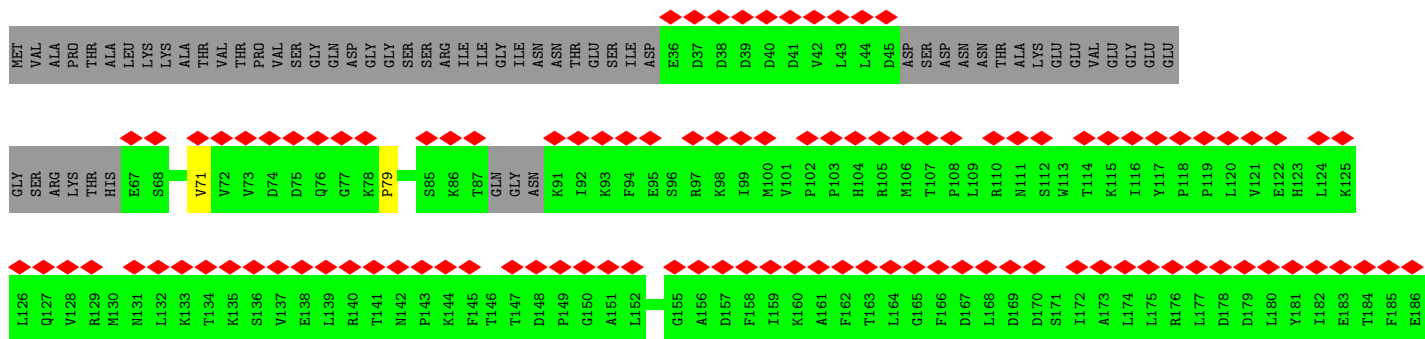
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I1612	E1612	LEU	I1558	I1559	LEU	T1428	T1428	ASN	A1306	N1238	C1178	S1117	E1040	M862	K780	
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V1617	E1617	ARG	F1434	F1435	PHE	F1434	F1435	PHE	S1312	I1246	L1122	L1122	I046	L873	Q787	
S1495	E1495	ILE	E1435	E1436	ILE	E1435	E1436	ILE	S1184	L1246	S1184	Y1123	L047	L874	V788	
D1496	E1496	THR	D1436	D1437	THR	D1436	D1437	THR	S1314	L1247	L1185	Y1124	R1048	L875		
D1497	E1497	ASN	M1437	M1438	ASN	M1437	M1438	ASN	K1248	K1248	D1125	D1125	R1048	A875	F793	
I1498	E1498	LEU	I1438	I1439	LEU	I1438	I1439	LEU	V1187	V1187	Y1186	Y1186	R1048	Y876		
R1499	E1499	GLN	L1440	L1441	GLN	L1440	L1441	GLN	L1249	L1249	E1126	E1126	M1050	K877	I796	
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Q1543	E1543	LEU	Y1484	Y1485	LEU	Y1484	Y1485	LEU	S1301	S1301	L1232	L1232	M1053			
A1544	E1544	LEU	L1485	L1486	LEU	L1485	L1486	LEU	S1302	S1302	K1234	K1234	M1053			
V1545	E1545	LEU			LEU			LEU	K1303	K1303	L1235	L1235	M1053			
Q1546	E1546	LEU			LEU			LEU					M1053			

THR LEU SER ASN GLU CYS CYS LYS LYS ILE	D2347 E2348 H2349 R2350 M2351 F2354 M2355 S2356 K2357 LYS ALA CYS GLN ILE LEU LEU LEU LEU D2425 F2426 T2427 R2428 I2429 Y2430 T2431 V2432 R2433 K2434 Q2435 T2436 V2437 L2438	H1669 L1670 V1671 F1672 V1673 I1674 K1675 E1676 L1677 M1678 A1679 T1680 L1681 K1682 R1683 G1684 S1685 Q1686 I1687 H1688 V1689 L1690 S1691 I1692 T1693 V1694 H1695 R1696 H1697 I1698 K1699 H1702 L1705 K1706 H1707 S1708 D1709 L1710 D1711 L1712 S1713 S1714 S1715 M1716 I1717 V1718 K1719 M1722 E1723 M1724 I1725 F1726 G1727 F1728 A1729 G1730	K1733 D1734 S1735 E1736 H1739 T1740 K1741 V1742 K1743 E1744 I1745 K1746 S1747 M1748 K1749 I1756 L1757 S1758 V1759 N1760 I1761 S1762 L1763 T1764 E1765 F1766 G1767 T1768 L1769 L1770 S1771 P1772 V1773 K1774 A1775 L1776 L1777 M1778 V1779 R1780 I1781 N1782 L1783 R1784 N1785 Q1786 L1787 K1788 L1789 S1790 E1791 L1792 L1793 R1794 R1795 Y1796 L1797	M1801 H1802 M1803 S1804 D1805 S1806 E1807 S1808 I1809 S1810 I1811 L1812 K1813 F1814 C1815 H1816 Q1817 L1818 F1819 Q1820 E1821 S1822 E1823 MET SER ASN SER PRO GLN ILE PRO LYS LYS VAL ASP GLN VAL VAL ASP GLU LYS ASP PHE PHE LEU VAL ASN ASN GLU SER LYS SER TYR THR ILE ASN SER ASN	S1861 L1862 L1863 L1864 M1865 S1866 T1867 L1868 Q1869 K1870 D1874 R1877 M1878 V1879 I1880 T1881 R1882 L1883 R1884 S1885 S1886 L1887 T1888 V1889 H1890 H1891 L1892 E1893 G1894 F1895 I1896 P1897 F1898 L1899 R1900 D1901 S1902 L1903 L1904 S1905 I1906 M1907 E1908 G1909 I1910 D1911 S1912 I1913 T1914 L1915 K1916 I1919 T1920 L1921 I1922 R1923 L1924	D1925 F1926 S1927 D1928 E1929 S1930 S1931 E1932 I1933 F1934 K1935 M1936 A1937 C1938 R1939 K1940 V1941 L1942 M1943 I1944 I1945 K1946 V1947 S1948 T1949 P1949 T1951 S1952 S1953 E1954 L1955 C1956 Q1957 M1958 G1959 L1960 K1961 F1962 L1963 S1964 A1965 F1966 T1967 R1968 H1969 T1970 D1971 S1972 T1973 L1974 K1975 D1976 T1977 A1978 S1980 Y1981 V1982 L1983 G1984	R1985 V1986 L1987 P1988 D1989 L1990 M1991 E1992 S1993 S1994 G1995 Q1996 G1997 L1998 L1999 F2000 M2001 F2002 L2003 K2004 A2005 L2006 V2007 S2008 K2009 H2010 I2011 M2012 L2013 P2014 E2015 L2016 Y2017 D2018 D2019 I2019 A2020 D2021 T2022 T2023 R2024 E2025 I2026 M2027 V2028 T2029 N2030 H2031 S2032 K2033 E2034 I2035 T2036 D2037 V2038 S2039 R2040 S2041 V2042 Y2043 Y2044	Q2045 F2046 L2047 M2048 E2049 Y2050 D2051 Q2052 S2053 K2054 G2055 R2056 L2057 D2058 E2059 K2060 F2061 K2062 F2063 M2064 V2065 D2066 M2067 L2068 Q2069 Y2070 P2071 T2072 E2073 S2074 G2075 R2076 Q2077 S2078 V2079 M2080 E2081 L2082 I2083 N2084 L2085 L2086 I2087 T2088 K2089 ALA ASN P2092 A2093 L2094 L2095 S2096 K2097 L2098 S2099 T2100 S2101 F2102 L2103 L2104	A2105 L2106 V2107 N2108 D2109 S2110 F2111 N2112 D2113 D2114 A2115 R2116 R2117 C2118 R2119 E2120 M2121 A2122 S2123 V2124 L2125 T2126 S2127 T2128 M2129 L2130 P2131 K2132 L2133 E2134 M2135 K2136 D2137 L2138 E2139 T2140 V2141 E2142 K2143 Y2144 L2145 A2146 A2147 TRP LEU LYS GLN VAL D2153 N2154 A2155 S2156 F2157 L2158 M2159 L2160 G2161 L2162 R2163 T2164	Y2165 K2166 V2167 TRP LEU LYS S2171 I2172 G2173 F2174 E2175 H2176 T2177 I2178 L2179 D2180 L2181 E2182 L2183 A2184 I2185 K2186 L2187 I2188 R2189 TYR ILE LEU SER ASP THR SER VAL GLY SER GLU HIS GLN TRP ASP LEU VAL TYR SER ALA ASN F2213 S2214 S2215 Y2216 M2217 E2218 E2221 S2222 V2223 Y2224 K2225	H2226 G2227 PHE LYS ASP ILE W2232 D2233 G2234 I2235 I2236 T2237 C2238 L2239 L2240 Y2241 P2242 H2243 S2244 W2245 V2246 ARG GLN SER ALA A2251 M2252 L2253 V2254 H2255 Q2256 L2257 I2258 A2259 M2260 K2261 D2262 K2263 L2264 E2265 I2266 L2268 T2269 ASN LEU GLU ILE GLN T2275 I2276 T2278 R2279 I2280 H2282 Q2283 L2284 G2285	A2286 P2287 S2288 I2289 P2290 GLU ASN LEU A2294 N2295 V2296 S2297 I2298 K2299 T2300 L2301 V2302 N2303 I2304 S2305 I2306 L2307 M2308 K2309 E2310 Q2311 ARG THR PRO PHE ILE MET ASP VAL SER LYS LYS G2323 G2324 E2325 D2326 L2327 K2328 Y2329 T2330 T2331 A2332 L2333 D2334 V2337 T2338 R2339 ILE GLY G2342 I2343 I2344 R2345 S2346	D2347 E2348 H2349 R2350 M2351 F2354 M2355 S2356 K2357 LYS ALA CYS GLN ILE LEU LEU LEU A2365 L2366 L2367 V2368 Q2369 V2370 L2371 D2372 E2373 D2374 E2375 V2376 I2377 A2378 E2379 G2380 E2381 LYS ILE LEU LEU PRO LEU TYR GLY Y2390 L2391 E2392 T2393 Y2394 S2396 S2397 R2397 A2398 Y2399 D2400 E2401 E2402 Q2403 E2404 E2405 L2406 ARG
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• Molecule 62: Unassigned peptides 1



• Molecule 63: Pno1



S481	T482	K541	L642	H543	K644	E485	V486	T487	K488	V489	F490	M492	T493	D494	G495	V496	L497	L498	R499	E500	M501	M502	H503	D504	F505	F506	L507	T508	K509	Y510	S511	S512	I513	I514	I515	D516	E517	A518	H519	E520	R521	N522	I523	N524	T525	D526	I527	L528	I529	G530	M531	L532	S533	R534	C535	V536	R537	L538	R539	A540
K641	L642	H543	K644	E485	V486	T487	K488	V489	F490	M492	T493	D494	G495	V496	L497	L498	R499	E500	M501	M502	H503	D504	F505	F506	L507	T508	K509	Y510	S511	S512	I513	I514	I515	D516	E517	A518	H519	E520	R521	N522	I523	N524	T525	D526	I527	L528	I529	G530	M531	L532	S533	R534	C535	V536	R537	L538	R539	A540		
M601	Y602	T603	D604	E605	V606	T607	K608	V609	F610	M612	T613	D614	G615	V616	L617	L618	R619	E620	M621	M622	H623	D624	F625	F626	L627	T628	K629	Y630	S631	S632	I633	I634	I635	D636	E637	A638	H639	E640	R641	N642	I643	N644	T645	D646	G647	M648	L649	G650	M651	L652	S653	R654	C655	V656	R657	L658	R659	A660		
K661	M662	G663	I664	M665	S666	T667	K668	V669	D670	L671	E672	A673	H674	G675	V676	L677	L678	R679	E680	M681	M682	H683	D684	F685	F686	L687	T688	K689	Y690	S691	S692	I693	I694	I695	D696	E697	A698	H699	E700	R701	N702	I703	N704	T705	D706	G707	M708	L709	G710	M711	L712	S713	R714	C715	V716	R717	L718	R719	A720	
E721	G722	Q723	T724	A725	N726	D727	K728	V729	F730	M731	L732	T733	D734	G735	V736	L737	L738	R739	E740	M741	M742	H743	D744	F745	F746	L747	T748	K749	Y750	S751	S752	I753	I754	I755	D756	E757	A758	H759	E760	R761	N762	I763	N764	T765	D766	G767	M768	L769	G770	M771	L772	S773	R774	C775	V776	R777	L778	R779	A780	
R781	S782	K783	E784	R785	K786	Y787	N788	E789	S790	F791	G792	H793	D794	G795	V796	L797	L798	R799	E800	M801	M802	H803	D804	F805	F806	L807	T808	K809	Y810	S811	S812	I813	I814	I815	D816	E817	A818	H819	E820	R821	N822	I823	N824	T825	D826	G827	M828	L829	G830	M831	L832	S833	R834	C835	V836	R837	L838	R839	A840	
E841	L842	L843	R844	M845	P846	V847	E848	S849	T850	M851	L852	Q853	M854	K855	S856	M857	V858	L859	H860	M861	M862	H863	D864	F865	F866	L867	T868	K869	Y870	S871	S872	I873	I874	I875	D876	E877	A878	H879	E880	R881	N882	I883	N884	T885	D886	G887	M888	L889	G890	M891	L892	S893	R894	C895	V896	R897	L898	R899	A900	
K901	M902	S903	L904	F905	P906	L907	S908	P909	R910	F911	S912	K913	M914	L915	L916	Y917	S918	D919	E920	K921	A922	C923	L924	P925	Y926	I927	V928	A929	R930	Q931	D932	R933	L934	S935	V936	G937	D938	P939	F940	Q941	N942	L943	E944	F945	Y946	G947	I948	L949	G950	M951	L952	S953	R954	C955	V956	R957	L958	R959	A960	
LEU	ASP	ASP	LYS	ILE	ARC	GLU	HIS	ASP	THR	PRO	GLY	MET	ASP	P977	E978	L979	K980	K981	E982	L983	R984	S985	K986	F987	Y988	K989	S990	R991	I992	Q993	F994	S995	K996	S997	D998	P999	V1000	F1001	S1001	D1002	V1003	F1004	R1005	L1006	N942	E943	F944	V1009	A1012	M1013	D1014	Y1015	V1016	P1017	K1018	E1019	Q1020	K1021		
E1022	I1023	F1024	M1025	K1026	M1028	F1029	L1030	R1031	G1032	L1034	M1035	E1036	E1037	I1038	V1039	K1040	L1041	R1042	K1043	Q1044	L1045	M1046	Y1047	I1048	I1049	K1050	S1051	M1052	E1056	M1057	I1058	V1060	V1061	I1062	R1063	M1064	E1065	D1066	L1067	K1068	S1069	D1070	I1071	P1072	S1073	V1074	I1075	Q1076	I1077	I1078	L1079	L1080	K1081	Q1082	M1083					
I1084	C1085	A1086	G1087	F1088	V1089	D1090	H1091	V1092	A1093	V1094	R1095	D1097	L1098	L1099	F1100	P1101	D1102	A1104	K1105	I1106	T1107	M1108	R1109	S1110	I1111	I1112	I1113	N1114	Y1117	V1120	L1121	A1122	T1123	R1124	T1125	P1126	N1127	I1128	E1129	P1193	L1194	C1131	F1132	V1133	I1134	I1135	H1136	P1137	T1138	S1139	M1203	L1204	N1142	N1143	L1144	G1145				
E1146	M1147	P1148	P1149	Y1154	Y1155	S1156	L1157	H1158	L1159	G1160	G1161	M1162	M1163	K1164	T1165	R1166	M1167	M1168	T1169	D1172	I1173	A1174	S1175	L1176	P1177	L1178	A1179	M1180	I1181	A1182	M1183	K1184	G1185	L1186	L1187	L1188	T1189	Y1190	S1191	K1192	P1193	L1194	T1195	G1196	Q1197	G1198	L1199	K1200	T1201	V1202	M1203	L1204	S1205	P1206	T1207	E1208	R1209			
Y1210	C1211	Y1212	V1213	V1214	R1216	F1217	G1218	S1219	V1220	V1221	D1222	N1223	D1224	L1225	K1226	I1227	G1228	P1233	I1234	H1237	Q1238	K1239	K1240	Q1241	K1242	W1245	T1246	V1247	I1248	K1249	F1250	I1251	T1252	R1253	LYS	GLY	PHE	GLN	THR	ILE	THR	GLY	GLU	GLY	LYS	GLU	LYS	LYS	LYS											

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	3841	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/\text{\AA}^2$)	50	Depositor
Minimum defocus (nm)	1500	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.037	Depositor
Minimum map value	-0.015	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.002	Depositor
Recommended contour level	0.01	Depositor
Map size (Å)	531.19995, 531.19995, 531.19995	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.3279998, 1.3279998, 1.3279998	Depositor

5 Model quality i

5.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section: MG, ZN, GTP, ADP

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	3A	0.91	0/4141	1.25	39/6433 (0.6%)
2	5A	0.80	0/4605	1.08	13/7168 (0.2%)
3	SA	0.70	3/31727 (0.0%)	1.17	255/49393 (0.5%)
4	SC	0.47	0/1856	0.73	5/2490 (0.2%)
5	SF	0.35	0/1854	0.66	1/2504 (0.0%)
6	SG	0.53	0/1690	0.64	0/2285
7	SH	0.31	0/1341	0.60	0/1789
8	SI	0.38	0/1341	0.67	1/1806 (0.1%)
9	SJ	0.31	0/1347	0.59	1/1801 (0.1%)
10	SK	0.47	0/1410	0.60	0/1888
11	SM	0.31	0/1020	0.58	0/1374
12	SO	0.45	0/1109	0.62	0/1495
13	SP	0.49	0/879	0.69	0/1186
14	SR	0.58	0/990	0.73	1/1335 (0.1%)
15	SX	0.51	0/1020	0.65	1/1371 (0.1%)
16	SY	0.55	0/798	0.67	1/1065 (0.1%)
17	SZ	0.43	0/822	0.64	0/1103
18	Sc	0.44	0/613	0.65	0/828
19	Sd	0.54	0/499	0.66	0/670
20	3B	0.59	0/1901	0.66	1/2567 (0.0%)
20	3C	0.44	0/1796	0.62	1/2424 (0.0%)
21	3D	0.44	0/2891	0.63	3/3895 (0.1%)
22	3E	0.41	0/3059	0.62	3/4153 (0.1%)
23	3F	0.42	0/3715	0.64	2/5001 (0.0%)
24	3G	0.52	0/928	0.76	1/1262 (0.1%)
24	3H	0.47	0/928	0.69	2/1262 (0.2%)
25	A4	0.47	0/5321	0.66	5/7207 (0.1%)
26	A5	0.48	0/4044	0.68	5/5493 (0.1%)
27	A8	0.34	0/3249	0.71	10/4454 (0.2%)
28	A9	0.31	0/951	0.58	1/1287 (0.1%)
29	AE	0.37	0/10049	0.56	6/13737 (0.0%)
30	AF	0.53	0/3993	0.67	4/5413 (0.1%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z >5	RMSZ	# Z >5
31	AG	0.47	0/6699	0.65	3/9077 (0.0%)
32	B1	0.64	0/6474	0.68	7/8763 (0.1%)
33	B2	0.43	0/6628	0.67	3/8954 (0.0%)
34	B3	0.39	0/6014	0.69	7/8137 (0.1%)
35	B8	0.58	0/3848	0.66	4/5218 (0.1%)
36	BE	0.58	0/6580	0.66	7/8901 (0.1%)
37	B6	0.45	0/2849	0.58	1/3853 (0.0%)
38	5B	0.34	0/499	0.62	0/659
39	5C	0.61	0/3690	0.69	5/4991 (0.1%)
40	5D	0.51	0/1417	0.67	2/1885 (0.1%)
41	5E	0.38	0/1580	0.74	3/2115 (0.1%)
42	5F	0.38	0/1559	0.69	1/2097 (0.0%)
43	5G	0.39	0/1792	0.72	2/2425 (0.1%)
44	5H	0.52	0/601	0.57	0/789
45	5I	0.61	0/3844	0.66	2/5174 (0.0%)
46	5J	0.41	0/1151	0.54	0/1535
47	5K	0.57	0/1426	0.67	1/1917 (0.1%)
48	RA	0.34	0/2769	0.67	1/3753 (0.0%)
49	RB	0.38	0/1121	0.62	0/1487
50	RE	0.38	0/8924	0.63	8/12070 (0.1%)
51	RF	0.34	0/2004	0.63	2/2697 (0.1%)
52	RG	0.39	0/1727	0.68	2/2329 (0.1%)
52	RH	0.42	0/1828	0.61	0/2470
53	RJ	0.50	0/6514	0.61	1/8768 (0.0%)
54	RK	0.44	0/2832	0.65	3/3825 (0.1%)
55	RL	0.29	0/4549	0.50	0/6241
55	RM	0.25	0/3765	0.47	0/5218
56	RN	0.36	0/4591	0.58	2/6187 (0.0%)
57	RO	0.38	0/3849	0.62	4/5261 (0.1%)
58	RP	0.28	0/12225	0.51	5/16812 (0.0%)
59	RQ	0.46	0/1879	0.62	1/2564 (0.0%)
60	RS	0.33	0/2104	0.67	2/2854 (0.1%)
61	RY	0.29	0/307	0.51	0/415
63	RT	0.42	0/1611	0.69	1/2174 (0.0%)
64	ST	0.37	0/908	0.67	1/1221 (0.1%)
65	SU	0.49	1/1130 (0.1%)	0.65	0/1517
66	RD	0.31	0/2453	0.63	3/3308 (0.1%)
67	RZ	0.32	0/6737	0.58	1/9099 (0.0%)
All	All	0.50	4/232365 (0.0%)	0.77	447/322899 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a

sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
4	SC	0	1
5	SF	0	2
8	SI	0	3
9	SJ	0	1
11	SM	0	1
12	SO	0	1
13	SP	0	1
17	SZ	0	1
18	Sc	0	1
21	3D	0	3
22	3E	0	1
23	3F	0	1
24	3G	0	2
24	3H	0	1
25	A4	0	1
26	A5	0	1
27	A8	0	2
31	AG	0	2
32	B1	0	2
33	B2	0	8
34	B3	0	11
36	BE	0	1
39	5C	0	1
40	5D	0	1
43	5G	0	2
45	5I	0	2
48	RA	0	2
49	RB	0	1
50	RE	0	1
51	RF	0	1
53	RJ	0	2
54	RK	0	1
55	RL	0	1
55	RM	0	1
56	RN	0	1
57	RO	0	1
58	RP	0	3
59	RQ	0	4
67	RZ	0	2
All	All	0	75

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
65	SU	46	PRO	C-N	8.58	1.50	1.34
3	SA	1572	G	O3'-P	-6.56	1.53	1.61
3	SA	1538	U	O3'-P	-5.78	1.54	1.61
3	SA	1541	G	O3'-P	5.54	1.67	1.61

All (447) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	3A	321	C	N1-C1'-C2'	-10.83	99.92	114.00
3	SA	861	U	C2-N1-C1'	10.61	130.44	117.70
3	SA	376	C	N1-C2-O2	10.38	125.13	118.90
3	SA	1174	C	N1-C2-O2	10.36	125.12	118.90
3	SA	1034	C	C5-C6-N1	10.05	126.02	121.00
3	SA	1541	G	P-O5'-C5'	-10.04	104.84	120.90
1	3A	104	C	C5-C6-N1	9.71	125.86	121.00
26	A5	25	ASP	CB-CG-OD1	9.52	126.87	118.30
24	3G	67	LEU	CA-CB-CG	9.37	136.85	115.30
3	SA	1743	U	N1-C2-O2	8.98	129.09	122.80
3	SA	1274	C	C6-N1-C2	-8.98	116.71	120.30
3	SA	1784	C	N3-C2-O2	-8.96	115.63	121.90
2	5A	312	U	P-O3'-C3'	8.95	130.44	119.70
4	SC	54	LEU	CA-CB-CG	8.94	135.87	115.30
3	SA	1451	C	N3-C2-O2	-8.88	115.68	121.90
50	RE	924	LEU	CA-CB-CG	8.79	135.51	115.30
3	SA	1274	C	C2-N1-C1'	8.73	128.40	118.80
3	SA	1174	C	N3-C2-O2	-8.67	115.83	121.90
3	SA	1254	U	N1-C2-O2	8.65	128.85	122.80
2	5A	310	U	N3-C2-O2	-8.64	116.15	122.20
1	3A	104	C	C6-N1-C2	-8.63	116.85	120.30
1	3A	200	C	C2-N1-C1'	8.62	128.29	118.80
3	SA	376	C	C2-N1-C1'	8.45	128.09	118.80
29	AE	95	ASP	CB-CG-OD1	8.43	125.89	118.30
1	3A	89	C	C2-N1-C1'	8.38	128.02	118.80
3	SA	258	C	N1-C2-O2	8.36	123.91	118.90
3	SA	1174	C	C2-N1-C1'	8.27	127.89	118.80
3	SA	1451	C	C6-N1-C2	-8.22	117.01	120.30
3	SA	1743	U	C2-N1-C1'	8.22	127.57	117.70
1	3A	200	C	N1-C2-O2	8.21	123.83	118.90
3	SA	1274	C	C5-C6-N1	8.20	125.10	121.00
41	5E	448	LEU	CA-CB-CG	8.18	134.11	115.30
3	SA	607	G	N3-C4-C5	-8.14	124.53	128.60
20	3B	306	LEU	CA-CB-CG	8.04	133.80	115.30
3	SA	275	C	N1-C2-O2	8.04	123.72	118.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	SA	607	G	C2-N3-C4	8.00	115.90	111.90
3	SA	1254	U	N3-C2-O2	-7.96	116.63	122.20
3	SA	1053	G	O5'-P-OP1	-7.94	98.56	105.70
3	SA	1484	G	OP2-P-O3'	7.94	122.66	105.20
3	SA	166	C	N1-C2-O2	7.91	123.65	118.90
1	3A	89	C	C6-N1-C2	-7.90	117.14	120.30
35	B8	521	LEU	CA-CB-CG	7.90	133.47	115.30
3	SA	1274	C	N1-C2-O2	7.85	123.61	118.90
3	SA	258	C	C2-N1-C1'	7.82	127.41	118.80
3	SA	374	U	C2-N1-C1'	7.82	127.08	117.70
3	SA	1541	G	O5'-P-OP2	7.82	120.08	110.70
3	SA	607	G	C4-N9-C1'	7.79	136.63	126.50
3	SA	376	C	N3-C2-O2	-7.75	116.47	121.90
48	RA	10	ASP	CB-CG-OD1	7.75	125.28	118.30
1	3A	201	C	N1-C2-O2	7.72	123.53	118.90
3	SA	1703	C	N3-C2-O2	-7.70	116.51	121.90
1	3A	89	C	N1-C2-O2	7.66	123.50	118.90
3	SA	374	U	N1-C2-O2	7.66	128.16	122.80
3	SA	1574	G	N9-C1'-C2'	-7.61	103.63	112.00
1	3A	89	C	C5-C6-N1	7.60	124.80	121.00
3	SA	861	U	C6-N1-C1'	-7.59	110.58	121.20
3	SA	1254	U	C2-N1-C1'	7.55	126.76	117.70
2	5A	91	U	C5-C6-N1	7.54	126.47	122.70
25	A4	225	LEU	CA-CB-CG	7.45	132.44	115.30
3	SA	1493	C	N1-C2-O2	7.45	123.37	118.90
36	BE	536	LEU	CA-CB-CG	7.36	132.23	115.30
60	RS	270	LEU	CA-CB-CG	7.35	132.22	115.30
3	SA	275	C	C2-N1-C1'	7.29	126.82	118.80
2	5A	310	U	N1-C2-O2	7.27	127.89	122.80
3	SA	1258	U	C2-N1-C1'	7.27	126.42	117.70
2	5A	90	G	O4'-C1'-N9	7.26	114.01	108.20
1	3A	308	U	N3-C2-O2	-7.25	117.12	122.20
27	A8	258	PRO	N-CA-CB	7.24	111.99	103.30
3	SA	1228	G	N3-C4-C5	-7.22	124.99	128.60
3	SA	1541	G	C5'-C4'-O4'	7.20	117.74	109.10
3	SA	1493	C	C2-N1-C1'	7.18	126.70	118.80
30	AF	469	LEU	CA-CB-CG	7.15	131.74	115.30
56	RN	662	LEU	CA-CB-CG	7.14	131.73	115.30
3	SA	579	A	P-O3'-C3'	7.14	128.26	119.70
3	SA	1484	G	P-O3'-C3'	-7.12	111.16	119.70
3	SA	1451	C	N1-C2-O2	7.11	123.17	118.90
26	A5	24	LEU	CA-CB-CG	7.11	131.66	115.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	5A	312	U	C5-C6-N1	-7.10	119.15	122.70
3	SA	272	U	P-O3'-C3'	7.04	128.15	119.70
3	SA	1541	G	O5'-C5'-C4'	7.04	125.08	111.70
39	5C	144	LEU	CA-CB-CG	7.04	131.48	115.30
3	SA	311	U	N1-C2-O2	7.02	127.72	122.80
66	RD	1223	PRO	N-CA-CB	7.00	111.70	103.30
21	3D	292	LEU	CA-CB-CG	6.99	131.38	115.30
3	SA	1258	U	N1-C2-O2	6.99	127.69	122.80
3	SA	1803	G	P-O3'-C3'	6.96	128.05	119.70
24	3H	65	LEU	CB-CG-CD1	-6.95	99.19	111.00
3	SA	1056	U	N1-C2-O2	6.94	127.66	122.80
1	3A	248	G	O4'-C1'-N9	6.90	113.72	108.20
3	SA	1784	C	N1-C2-O2	6.88	123.03	118.90
3	SA	280	U	N3-C2-O2	-6.87	117.39	122.20
27	A8	325	PRO	N-CA-CB	6.87	111.55	103.30
3	SA	374	U	N3-C2-O2	-6.87	117.39	122.20
3	SA	381	C	N3-C2-O2	-6.85	117.10	121.90
3	SA	1743	U	C6-N1-C1'	-6.85	111.61	121.20
3	SA	1034	C	C6-N1-C2	-6.83	117.57	120.30
1	3A	104	C	C2-N1-C1'	6.83	126.32	118.80
3	SA	1704	U	N1-C2-O2	6.83	127.58	122.80
3	SA	258	C	N3-C2-O2	-6.83	117.12	121.90
3	SA	1566	U	N3-C2-O2	-6.80	117.44	122.20
2	5A	312	U	OP1-P-O3'	6.80	120.15	105.20
3	SA	209	U	N3-C2-O2	-6.79	117.45	122.20
1	3A	72	C	C6-N1-C2	-6.77	117.59	120.30
16	SY	132	LEU	CA-CB-CG	6.76	130.85	115.30
33	B2	757	ASP	CB-CG-OD1	6.75	124.37	118.30
3	SA	311	U	C2-N1-C1'	6.74	125.79	117.70
3	SA	56	U	P-O3'-C3'	6.73	127.78	119.70
3	SA	1541	G	C2'-C3'-O3'	6.72	124.46	113.70
3	SA	1661	U	C5-C6-N1	6.70	126.05	122.70
3	SA	648	G	N3-C4-N9	6.68	130.01	126.00
50	RE	1105	PRO	O-C-N	-6.68	112.02	122.70
3	SA	1174	C	C6-N1-C2	-6.66	117.64	120.30
3	SA	1258	U	N3-C2-O2	-6.66	117.54	122.20
3	SA	1527	C	N1-C2-O2	6.66	122.90	118.90
3	SA	607	G	N3-C4-N9	6.66	130.00	126.00
3	SA	545	A	O4'-C1'-N9	6.64	113.51	108.20
3	SA	608	U	C2-N1-C1'	6.63	125.66	117.70
1	3A	99	U	C4'-C3'-O3'	6.63	126.26	113.00
3	SA	1052	U	O4'-C1'-N1	6.63	113.50	108.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
21	3D	142	LEU	CA-CB-CG	6.60	130.48	115.30
27	A8	392	PRO	N-CA-CB	6.59	111.21	103.30
37	B6	18	LEU	CA-CB-CG	6.59	130.45	115.30
24	3H	65	LEU	CA-CB-CG	6.53	130.31	115.30
3	SA	280	U	C2-N1-C1'	6.53	125.53	117.70
30	AF	327	LEU	CA-CB-CG	6.50	130.26	115.30
3	SA	864	U	C2-N1-C1'	6.50	125.50	117.70
53	RJ	252	LEU	CA-CB-CG	6.50	130.25	115.30
3	SA	401	A	P-O3'-C3'	6.49	127.49	119.70
3	SA	1175	U	N3-C2-O2	-6.47	117.67	122.20
3	SA	1274	C	N3-C2-O2	-6.47	117.37	121.90
1	3A	318	U	O5'-P-OP2	-6.47	99.88	105.70
3	SA	302	U	N3-C2-O2	-6.46	117.67	122.20
26	A5	452	LEU	CA-CB-CG	6.46	130.15	115.30
3	SA	280	U	N1-C2-O2	6.45	127.31	122.80
32	B1	717	LEU	CA-CB-CG	6.45	130.13	115.30
45	5I	368	ASP	CB-CG-OD1	6.44	124.10	118.30
4	SC	120	LEU	CA-CB-CG	6.42	130.07	115.30
41	5E	314	LEU	CA-CB-CG	6.41	130.04	115.30
3	SA	965	U	C2-N1-C1'	6.41	125.39	117.70
3	SA	1232	U	N1-C2-O2	6.40	127.28	122.80
1	3A	250	C	N1-C2-O2	6.38	122.73	118.90
3	SA	1228	G	C2-N3-C4	6.38	115.09	111.90
3	SA	166	C	N3-C2-O2	-6.37	117.44	121.90
1	3A	200	C	C6-N1-C1'	-6.36	113.16	120.80
3	SA	1175	U	N1-C2-O2	6.36	127.25	122.80
3	SA	275	C	N3-C2-O2	-6.35	117.46	121.90
3	SA	864	U	N3-C2-O2	-6.34	117.76	122.20
3	SA	1594	G	P-O3'-C3'	6.34	127.31	119.70
3	SA	648	G	C4-N9-C1'	6.33	134.73	126.50
3	SA	1440	C	C6-N1-C2	-6.33	117.77	120.30
1	3A	317	A	C4'-C3'-O3'	6.33	125.66	113.00
3	SA	1704	U	N3-C2-O2	-6.32	117.78	122.20
58	RP	48	LEU	CA-CB-CG	6.30	129.78	115.30
30	AF	95	LEU	CA-CB-CG	6.29	129.78	115.30
3	SA	1703	C	N1-C2-O2	6.29	122.67	118.90
3	SA	38	C	N1-C2-O2	6.28	122.67	118.90
1	3A	312	U	P-O3'-C3'	6.26	127.21	119.70
3	SA	1496	U	C2-N1-C1'	6.24	125.19	117.70
26	A5	457	LEU	CA-CB-CG	6.24	129.64	115.30
3	SA	861	U	N1-C2-O2	6.23	127.16	122.80
3	SA	1056	U	N3-C2-O2	-6.19	117.86	122.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	SA	1228	G	C4-N9-C1'	6.18	134.53	126.50
27	A8	309	PRO	N-CA-CB	6.18	110.72	103.30
2	5A	312	U	C2-N1-C1'	-6.18	110.29	117.70
3	SA	826	U	O4'-C1'-N1	6.17	113.13	108.20
3	SA	1527	C	C2-N1-C1'	6.14	125.55	118.80
1	3A	198	U	P-O3'-C3'	6.13	127.05	119.70
3	SA	864	U	N1-C2-O2	6.12	127.09	122.80
3	SA	1496	U	N1-C2-O2	6.12	127.09	122.80
3	SA	514	G	N7-C8-N9	6.11	116.15	113.10
3	SA	376	C	C6-N1-C2	-6.10	117.86	120.30
3	SA	1055	U	N3-C2-O2	-6.10	117.93	122.20
3	SA	273	G	C4-N9-C1'	6.10	134.43	126.50
3	SA	935	U	N1-C2-O2	6.09	127.07	122.80
57	RO	269	LEU	CA-CB-CG	6.09	129.31	115.30
1	3A	308	U	N1-C2-O2	6.09	127.06	122.80
3	SA	648	G	C8-N9-C1'	-6.09	119.09	127.00
3	SA	1441	C	N3-C2-O2	-6.09	117.64	121.90
3	SA	607	G	C8-N9-C1'	-6.08	119.09	127.00
66	RD	1205	PRO	N-CA-CB	6.08	110.59	103.30
1	3A	200	C	C5-C6-N1	6.07	124.03	121.00
3	SA	209	U	N1-C2-O2	6.07	127.05	122.80
3	SA	575	C	N1-C2-O2	6.05	122.53	118.90
3	SA	1440	C	C5-C6-N1	6.05	124.03	121.00
3	SA	1533	C	P-O3'-C3'	6.05	126.96	119.70
54	RK	117	LEU	CA-CB-CG	6.05	129.21	115.30
3	SA	1566	U	N1-C2-O2	6.03	127.02	122.80
3	SA	1439	C	N3-C2-O2	-6.02	117.68	121.90
3	SA	1784	C	C6-N1-C2	-6.02	117.89	120.30
32	B1	521	LEU	CA-CB-CG	6.01	129.12	115.30
3	SA	1620	C	N1-C2-O2	6.00	122.50	118.90
2	5A	492	G	P-O3'-C3'	6.00	126.90	119.70
42	5F	57	LEU	CA-CB-CG	6.00	129.10	115.30
3	SA	-7	A	P-O3'-C3'	6.00	126.89	119.70
3	SA	1259	U	C5-C6-N1	5.98	125.69	122.70
3	SA	311	U	N3-C2-O2	-5.97	118.02	122.20
3	SA	275	C	C6-N1-C2	-5.96	117.91	120.30
27	A8	453	PRO	N-CA-CB	5.96	110.46	103.30
3	SA	645	C	N1-C2-O2	5.96	122.48	118.90
3	SA	1485	C	N1-C2-O2	5.95	122.47	118.90
9	SJ	29	LEU	CA-CB-CG	5.94	128.97	115.30
1	3A	72	C	C5-C6-N1	5.93	123.96	121.00
3	SA	381	C	N1-C2-O2	5.92	122.45	118.90

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	SA	1084	A	OP1-P-O3'	5.92	118.21	105.20
3	SA	1490	C	N1-C2-O2	5.91	122.44	118.90
3	SA	1232	U	N3-C2-O2	-5.90	118.07	122.20
3	SA	1254	U	C5-C6-N1	5.90	125.65	122.70
3	SA	1679	G	O4'-C1'-N9	5.90	112.92	108.20
32	B1	479	LEU	CA-CB-CG	5.90	128.87	115.30
58	RP	1797	LEU	CA-CB-CG	5.90	128.87	115.30
3	SA	1228	G	N3-C4-N9	5.89	129.53	126.00
3	SA	1216	C	N3-C2-O2	-5.89	117.78	121.90
3	SA	1232	U	C2-N1-C1'	5.89	124.76	117.70
3	SA	1493	C	N3-C2-O2	-5.88	117.78	121.90
43	5G	109	LEU	CA-CB-CG	5.88	128.83	115.30
3	SA	0	U	P-O3'-C3'	5.88	126.76	119.70
3	SA	1034	C	C2-N1-C1'	5.88	125.27	118.80
40	5D	28	LEU	CA-CB-CG	5.87	128.81	115.30
67	RZ	658	PRO	N-CA-CB	5.87	110.35	103.30
3	SA	1084	A	P-O3'-C3'	5.87	126.75	119.70
63	RT	79	PRO	N-CA-CB	5.86	110.33	103.30
3	SA	608	U	N1-C2-O2	5.86	126.90	122.80
3	SA	1055	U	N1-C2-O2	5.85	126.90	122.80
43	5G	152	LEU	CA-CB-CG	5.84	128.74	115.30
52	RG	96	LEU	CA-CB-CG	5.84	128.74	115.30
3	SA	562	G	O4'-C1'-N9	5.84	112.87	108.20
3	SA	1534	G	N9-C1'-C2'	-5.84	105.58	112.00
3	SA	542	A	P-O3'-C3'	5.83	126.70	119.70
34	B3	401	LEU	CA-CB-CG	5.83	128.70	115.30
32	B1	69	LEU	CA-CB-CG	5.82	128.69	115.30
27	A8	429	PRO	N-CA-CB	5.81	110.27	103.30
27	A8	298	PRO	N-CA-CB	5.80	110.26	103.30
27	A8	390	PRO	N-CA-CB	5.79	110.25	103.30
3	SA	417	A	P-O3'-C3'	5.79	126.65	119.70
39	5C	74	LEU	CA-CB-CG	5.78	128.60	115.30
3	SA	1734	U	N3-C2-O2	-5.78	118.16	122.20
3	SA	87	C	C6-N1-C2	-5.77	117.99	120.30
36	BE	522	LEU	CA-CB-CG	5.77	128.56	115.30
3	SA	612	U	C2-N1-C1'	5.75	124.60	117.70
1	3A	201	C	N3-C2-O2	-5.75	117.88	121.90
34	B3	342	ASP	CB-CG-OD1	5.75	123.47	118.30
36	BE	872	LEU	CA-CB-CG	5.75	128.52	115.30
3	SA	194	U	C2-N1-C1'	5.74	124.59	117.70
36	BE	121	LEU	CA-CB-CG	5.73	128.48	115.30
3	SA	1448	G	C5-C6-O6	5.72	132.03	128.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
30	AF	195	LEU	CA-CB-CG	5.72	128.47	115.30
3	SA	310	C	C6-N1-C2	-5.71	118.01	120.30
27	A8	235	PRO	N-CA-CB	5.71	110.15	103.30
3	SA	373	G	N3-C4-C5	-5.71	125.75	128.60
3	SA	1496	U	N3-C2-O2	-5.71	118.21	122.20
3	SA	1521	G	P-O3'-C3'	5.70	126.55	119.70
3	SA	894	U	N1-C2-O2	5.70	126.79	122.80
8	SI	38	LEU	CA-CB-CG	5.70	128.41	115.30
3	SA	885	G	C8-N9-C4	-5.69	104.12	106.40
3	SA	376	C	C6-N1-C1'	-5.69	113.97	120.80
3	SA	411	C	N1-C2-O2	5.69	122.31	118.90
3	SA	1199	G	N3-C4-N9	5.69	129.41	126.00
3	SA	569	C	C6-N1-C2	-5.69	118.03	120.30
3	SA	1743	U	N3-C2-O2	-5.69	118.22	122.20
45	5I	62	LEU	CA-CB-CG	5.67	128.35	115.30
29	AE	604	LEU	CA-CB-CG	5.67	128.33	115.30
35	B8	387	LEU	CA-CB-CG	5.66	128.32	115.30
25	A4	422	LEU	CA-CB-CG	5.65	128.30	115.30
3	SA	1034	C	N1-C2-O2	5.63	122.28	118.90
3	SA	376	C	C5-C6-N1	5.63	123.81	121.00
32	B1	716	ASP	CB-CG-OD1	5.62	123.36	118.30
3	SA	1705	C	C6-N1-C2	-5.62	118.05	120.30
3	SA	273	G	N3-C4-N9	5.62	129.37	126.00
3	SA	273	G	N3-C4-C5	-5.61	125.80	128.60
31	AG	449	LEU	CA-CB-CG	5.61	128.20	115.30
59	RQ	801	PRO	N-CA-CB	5.61	110.03	103.30
3	SA	1174	C	C5-C6-N1	5.58	123.79	121.00
1	3A	313	A	C4-C5-C6	-5.58	114.21	117.00
3	SA	1585	U	N1-C2-O2	5.58	126.70	122.80
25	A4	534	LEU	CA-CB-CG	5.58	128.13	115.30
3	SA	1056	U	C2-N1-C1'	5.55	124.36	117.70
3	SA	1554	U	N1-C2-O2	5.55	126.69	122.80
3	SA	1441	C	N1-C2-O2	5.55	122.23	118.90
28	A9	516	LEU	CA-CB-CG	5.55	128.06	115.30
1	3A	106	C	C5-C6-N1	5.55	123.77	121.00
3	SA	1161	C	C5-C6-N1	5.54	123.77	121.00
39	5C	414	LEU	CA-CB-CG	5.54	128.05	115.30
36	BE	417	LEU	CA-CB-CG	5.54	128.03	115.30
3	SA	894	U	N3-C2-O2	-5.53	118.33	122.20
3	SA	1585	U	N3-C2-O2	-5.52	118.34	122.20
35	B8	272	LEU	CA-CB-CG	5.52	127.99	115.30
2	5A	90	G	C8-N9-C1'	5.51	134.16	127.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	SA	87	C	C5-C6-N1	5.51	123.75	121.00
3	SA	411	C	N3-C2-O2	-5.51	118.05	121.90
1	3A	313	A	N3-C4-N9	-5.50	123.00	127.40
52	RG	50	LEU	CA-CB-CG	5.49	127.93	115.30
3	SA	514	G	C8-N9-C4	-5.49	104.20	106.40
5	SF	42	LEU	CA-CB-CG	5.49	127.92	115.30
29	AE	526	LEU	CA-CB-CG	5.49	127.92	115.30
47	5K	17	LEU	CA-CB-CG	5.49	127.92	115.30
3	SA	1734	U	N1-C2-O2	5.48	126.63	122.80
29	AE	370	LEU	CA-CB-CG	5.46	127.86	115.30
39	5C	416	LEU	CA-CB-CG	5.46	127.85	115.30
27	A8	316	PRO	N-CA-CB	5.45	109.84	103.30
3	SA	38	C	C6-N1-C2	-5.45	118.12	120.30
3	SA	607	G	C8-N9-C4	-5.45	104.22	106.40
36	BE	614	LEU	CA-CB-CG	5.45	127.83	115.30
20	3C	306	LEU	CA-CB-CG	5.44	127.82	115.30
3	SA	50	C	C2-N1-C1'	5.44	124.79	118.80
3	SA	258	C	C6-N1-C2	-5.44	118.12	120.30
34	B3	471	PRO	C-N-CA	5.44	135.30	121.70
3	SA	530	C	N1-C2-O2	5.43	122.16	118.90
3	SA	373	G	C4-N9-C1'	5.43	133.56	126.50
3	SA	1568	C	P-O3'-C3'	5.43	126.22	119.70
1	3A	248	G	P-O3'-C3'	5.43	126.22	119.70
3	SA	894	U	C2-N1-C1'	5.43	124.22	117.70
3	SA	965	U	N1-C2-O2	5.42	126.59	122.80
3	SA	258	C	C6-N1-C1'	-5.42	114.30	120.80
4	SC	172	LEU	CA-CB-CG	5.42	127.76	115.30
54	RK	296	LEU	CA-CB-CG	5.42	127.76	115.30
31	AG	323	LEU	CA-CB-CG	5.41	127.75	115.30
34	B3	736	LEU	CA-CB-CG	5.41	127.74	115.30
3	SA	38	C	C2-N1-C1'	5.41	124.75	118.80
3	SA	1505	A	C8-N9-C4	-5.40	103.64	105.80
3	SA	916	U	N3-C2-O2	-5.40	118.42	122.20
3	SA	275	C	C5-C6-N1	5.40	123.70	121.00
3	SA	608	U	N3-C2-O2	-5.40	118.42	122.20
3	SA	1448	G	N1-C6-O6	-5.39	116.66	119.90
3	SA	648	G	C6-C5-N7	-5.39	127.16	130.40
3	SA	128	U	C2-N1-C1'	5.39	124.17	117.70
3	SA	908	U	N1-C2-O2	5.39	126.57	122.80
1	3A	89	C	N3-C2-O2	-5.39	118.13	121.90
3	SA	1484	G	O3'-P-O5'	-5.39	93.77	104.00
29	AE	547	ILE	CG1-CB-CG2	-5.38	99.55	111.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
23	3F	315	LEU	CA-CB-CG	5.38	127.67	115.30
3	SA	79	C	N1-C2-O2	5.37	122.12	118.90
3	SA	311	U	C5-C6-N1	5.37	125.39	122.70
3	SA	680	U	C5-C6-N1	5.37	125.38	122.70
2	5A	312	U	O4'-C1'-N1	5.36	112.49	108.20
3	SA	75	U	C2-N1-C1'	5.36	124.13	117.70
3	SA	1174	C	C6-N1-C1'	-5.36	114.37	120.80
21	3D	152	LEU	CA-CB-CG	5.36	127.63	115.30
3	SA	908	U	N3-C2-O2	-5.36	118.45	122.20
3	SA	1064	G	C4-N9-C1'	5.35	133.46	126.50
3	SA	935	U	N3-C2-O2	-5.35	118.46	122.20
58	RP	155	LEU	CA-CB-CG	5.35	127.60	115.30
3	SA	1717	G	C4-N9-C1'	5.34	133.44	126.50
2	5A	90	G	C4-N9-C1'	-5.34	119.56	126.50
3	SA	937	C	C6-N1-C2	-5.34	118.17	120.30
3	SA	1269	U	N3-C2-O2	-5.33	118.47	122.20
50	RE	1037	LEU	CA-CB-CG	-5.33	103.04	115.30
50	RE	365	LEU	CA-CB-CG	5.33	127.56	115.30
22	3E	401	LEU	CA-CB-CG	5.33	127.56	115.30
31	AG	889	ASP	CB-CG-OD1	5.33	123.09	118.30
3	SA	1783	C	C6-N1-C2	-5.33	118.17	120.30
3	SA	935	U	C5-C6-N1	5.33	125.36	122.70
34	B3	162	LEU	CB-CG-CD2	-5.33	101.94	111.00
3	SA	680	U	N1-C2-O2	5.32	126.53	122.80
3	SA	380	U	N1-C2-O2	5.31	126.52	122.80
1	3A	104	C	C2-N3-C4	5.30	122.55	119.90
50	RE	840	LEU	CA-CB-CG	5.30	127.48	115.30
3	SA	443	C	C5-C6-N1	5.29	123.64	121.00
3	SA	916	U	N1-C2-O2	5.28	126.50	122.80
3	SA	960	U	N3-C2-O2	-5.28	118.50	122.20
3	SA	1646	C	N1-C2-O2	5.28	122.07	118.90
3	SA	1708	U	C2-N1-C1'	5.28	124.04	117.70
3	SA	25	C	C2-N1-C1'	5.28	124.60	118.80
3	SA	1269	U	N1-C2-O2	5.28	126.49	122.80
3	SA	1664	C	N3-C2-O2	-5.28	118.21	121.90
3	SA	38	C	N3-C2-O2	-5.27	118.21	121.90
39	5C	148	LEU	CA-CB-CG	5.27	127.42	115.30
36	BE	536	LEU	CB-CG-CD2	-5.26	102.06	111.00
22	3E	227	LEU	CA-CB-CG	5.26	127.39	115.30
3	SA	1439	C	N1-C2-O2	5.25	122.05	118.90
3	SA	279	G	N3-C4-N9	-5.25	122.85	126.00
15	SX	93	LEU	CA-CB-CG	5.24	127.34	115.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
57	RO	388	LEU	CA-CB-CG	5.24	127.34	115.30
23	3F	348	LEU	CA-CB-CG	5.23	127.33	115.30
3	SA	49	C	C5-C6-N1	5.23	123.61	121.00
3	SA	827	C	C2-N1-C1'	5.23	124.55	118.80
58	RP	1770	LEU	CA-CB-CG	5.23	127.33	115.30
3	SA	1493	C	C6-N1-C2	-5.23	118.21	120.30
3	SA	-7	A	OP1-P-O3'	5.22	116.69	105.20
29	AE	94	LEU	CA-CB-CG	5.22	127.31	115.30
51	RF	147	LEU	CA-CB-CG	5.22	127.31	115.30
34	B3	12	LEU	CA-CB-CG	5.22	127.31	115.30
3	SA	677	G	N3-C4-N9	-5.22	122.87	126.00
3	SA	373	G	N3-C4-N9	5.22	129.13	126.00
3	SA	380	U	N3-C2-O2	-5.22	118.55	122.20
26	A5	151	LEU	CA-CB-CG	5.22	127.30	115.30
3	SA	443	C	C6-N1-C2	-5.21	118.22	120.30
3	SA	861	U	N3-C2-O2	-5.21	118.55	122.20
3	SA	8	U	N3-C2-O2	-5.21	118.56	122.20
50	RE	1105	PRO	CA-C-N	5.21	128.66	117.20
3	SA	1554	U	N3-C2-O2	-5.20	118.56	122.20
3	SA	612	U	N1-C2-O2	5.20	126.44	122.80
34	B3	394	LEU	CA-CB-CG	5.20	127.25	115.30
3	SA	411	C	C6-N1-C2	-5.19	118.22	120.30
35	B8	521	LEU	CB-CG-CD1	-5.19	102.17	111.00
3	SA	50	C	C6-N1-C2	-5.19	118.22	120.30
22	3E	141	LEU	CA-CB-CG	5.18	127.21	115.30
33	B2	267	ASP	C-N-CA	5.17	134.64	121.70
41	5E	449	ASP	CB-CG-OD1	5.17	122.95	118.30
1	3A	39	C	C2-N1-C1'	5.17	124.48	118.80
1	3A	205	G	P-O3'-C3'	5.15	125.88	119.70
4	SC	110	LEU	CA-CB-CG	5.15	127.14	115.30
3	SA	1533	C	C2'-C3'-O3'	5.15	121.94	113.70
3	SA	1704	U	C2-N1-C1'	5.15	123.88	117.70
3	SA	273	G	C8-N9-C1'	-5.14	120.31	127.00
1	3A	39	C	C6-N1-C2	-5.14	118.25	120.30
54	RK	325	LEU	CA-CB-CG	5.13	127.11	115.30
57	RO	211	LEU	CA-CB-CG	5.13	127.11	115.30
3	SA	885	G	N1-C6-O6	-5.12	116.83	119.90
3	SA	569	C	C5-C6-N1	5.12	123.56	121.00
3	SA	1053	G	C8-N9-C4	-5.11	104.36	106.40
25	A4	465	LEU	CA-CB-CG	5.09	127.01	115.30
3	SA	1568	C	C6-N1-C2	-5.09	118.26	120.30
3	SA	75	U	N3-C2-O2	-5.08	118.64	122.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	5A	310	U	C6-N1-C2	-5.08	117.95	121.00
1	3A	249	G	O5'-P-OP1	-5.08	101.13	105.70
51	RF	58	LEU	CA-CB-CG	5.07	126.96	115.30
3	SA	1664	C	C2-N1-C1'	5.07	124.38	118.80
1	3A	198	U	OP1-P-O3'	5.07	116.35	105.20
40	5D	91	LEU	CA-CB-CG	5.06	126.94	115.30
57	RO	264	LEU	CA-CB-CG	5.06	126.94	115.30
14	SR	123	ARG	C-N-CD	-5.06	109.47	120.60
4	SC	147	ALA	C-N-CA	5.06	134.34	121.70
50	RE	396	LEU	CA-CB-CG	5.05	126.92	115.30
1	3A	89	C	C6-N1-C1'	-5.05	114.74	120.80
3	SA	414	C	C5-C6-N1	5.05	123.53	121.00
25	A4	435	PRO	C-N-CA	5.05	134.33	121.70
3	SA	1717	G	N3-C4-N9	5.05	129.03	126.00
1	3A	200	C	C6-N1-C2	-5.04	118.28	120.30
50	RE	1102	LEU	CA-CB-CG	5.04	126.90	115.30
3	SA	861	U	C5-C6-N1	5.04	125.22	122.70
3	SA	130	C	C2-N1-C1'	5.04	124.34	118.80
3	SA	1664	C	C6-N1-C2	-5.04	118.29	120.30
32	B1	701	LEU	CA-CB-CG	5.03	126.88	115.30
33	B2	231	LEU	CA-CB-CG	5.03	126.87	115.30
66	RD	1502	LEU	CA-CB-CG	5.03	126.87	115.30
1	3A	199	G	N3-C4-N9	5.03	129.02	126.00
32	B1	436	LEU	CA-CB-CG	5.02	126.85	115.30
64	ST	109	LEU	CA-CB-CG	5.02	126.85	115.30
3	SA	1222	C	C5-C6-N1	5.02	123.51	121.00
3	SA	1258	U	C5-C6-N1	5.02	125.21	122.70
56	RN	744	LEU	CA-CB-CG	5.02	126.84	115.30
60	RS	392	TYR	CA-CB-CG	5.02	122.93	113.40
3	SA	532	U	N3-C2-O2	-5.01	118.69	122.20
3	SA	1083	G	C4-C5-N7	5.01	112.80	110.80
3	SA	1664	C	N1-C2-O2	5.01	121.91	118.90
3	SA	35	U	N1-C2-O2	5.01	126.30	122.80
58	RP	2033	LYS	C-N-CA	5.00	134.21	121.70

There are no chirality outliers.

All (75) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
21	3D	142	LEU	Peptide
21	3D	202	HIS	Peptide
21	3D	286	ARG	Peptide

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Mol	Chain	Res	Type	Group
22	3E	331	LYS	Peptide
23	3F	237	ASP	Peptide
24	3G	59	GLU	Peptide
24	3G	9	PHE	Peptide
24	3H	59	GLU	Peptide
39	5C	551	SER	Peptide
40	5D	138	ASP	Peptide
43	5G	254	PHE	Peptide
43	5G	74	ASP	Peptide
45	5I	230	ASN	Peptide
45	5I	283	ASP	Peptide
25	A4	54	LYS	Peptide
26	A5	167	SER	Peptide
27	A8	496	TYR	Peptide
27	A8	529	HIS	Peptide
31	AG	178	PHE	Peptide
31	AG	780	GLU	Peptide
32	B1	288	ASP	Peptide
32	B1	690	ALA	Peptide
33	B2	131	GLY	Peptide
33	B2	213	LYS	Peptide
33	B2	266	SER	Peptide
33	B2	267	ASP	Peptide
33	B2	278	ASP	Peptide
33	B2	44	SER	Peptide
33	B2	613	ALA	Peptide
33	B2	916	HIS	Peptide
34	B3	34	THR	Peptide
34	B3	435	ALA	Peptide
34	B3	473	ALA	Peptide
34	B3	479	ILE	Peptide
34	B3	480	ILE	Peptide
34	B3	585	ASN	Peptide
34	B3	593	CYS	Peptide
34	B3	594	GLY	Peptide
34	B3	627	ASN	Peptide
34	B3	89	HIS	Peptide
34	B3	90	LEU	Peptide
36	BE	94	TYR	Peptide
48	RA	111	TRP	Peptide
48	RA	173	LEU	Peptide
49	RB	261	SER	Peptide

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Mol	Chain	Res	Type	Group
50	RE	767	GLN	Peptide
51	RF	253	ALA	Peptide
53	RJ	1026	LYS	Peptide
53	RJ	868	ARG	Peptide
54	RK	333	PHE	Peptide
55	RL	743	VAL	Peptide
55	RM	743	VAL	Peptide
56	RN	286	SER	Peptide
57	RO	144	PRO	Peptide
58	RP	1746	LYS	Peptide
58	RP	2051	ASP	Peptide
58	RP	835	LEU	Peptide
59	RQ	313	PHE	Peptide
59	RQ	786	THR	Peptide
59	RQ	787	THR	Peptide
59	RQ	806	ARG	Peptide
67	RZ	1001	SER	Peptide
67	RZ	1069	SER	Peptide
4	SC	238	GLU	Peptide
5	SF	193	GLY	Peptide
5	SF	195	ILE	Peptide
8	SI	133	THR	Peptide
8	SI	31	SER	Peptide
8	SI	64	VAL	Peptide
9	SJ	85	PRO	Peptide
11	SM	128	CYS	Peptide
12	SO	58	HIS	Peptide
13	SP	90	ARG	Peptide
17	SZ	76	TYR	Peptide
18	Sc	49	HIS	Peptide

5.2 Too-close contacts [i](#)

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

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
4	SC	228/255 (89%)	196 (86%)	32 (14%)	0	100	100
5	SF	227/261 (87%)	197 (87%)	29 (13%)	1 (0%)	34	72
6	SG	211/225 (94%)	195 (92%)	16 (8%)	0	100	100
7	SH	161/236 (68%)	143 (89%)	18 (11%)	0	100	100
8	SI	161/190 (85%)	143 (89%)	18 (11%)	0	100	100
9	SJ	162/200 (81%)	140 (86%)	22 (14%)	0	100	100
10	SK	169/197 (86%)	163 (96%)	6 (4%)	0	100	100
11	SM	119/155 (77%)	103 (87%)	16 (13%)	0	100	100
12	SO	132/151 (87%)	123 (93%)	9 (7%)	0	100	100
13	SP	116/137 (85%)	100 (86%)	15 (13%)	1 (1%)	17	57
14	SR	123/143 (86%)	112 (91%)	11 (9%)	0	100	100
15	SX	125/130 (96%)	119 (95%)	6 (5%)	0	100	100
16	SY	101/145 (70%)	90 (89%)	11 (11%)	0	100	100
17	SZ	100/135 (74%)	87 (87%)	12 (12%)	1 (1%)	15	55
18	Sc	78/82 (95%)	69 (88%)	9 (12%)	0	100	100
19	Sd	61/67 (91%)	57 (93%)	4 (7%)	0	100	100
20	3B	236/327 (72%)	222 (94%)	14 (6%)	0	100	100
20	3C	221/327 (68%)	207 (94%)	14 (6%)	0	100	100
21	3D	359/504 (71%)	346 (96%)	13 (4%)	0	100	100
22	3E	427/511 (84%)	387 (91%)	40 (9%)	0	100	100
23	3F	446/573 (78%)	403 (90%)	42 (9%)	1 (0%)	47	81
24	3G	119/126 (94%)	107 (90%)	11 (9%)	1 (1%)	19	60
24	3H	119/126 (94%)	111 (93%)	8 (7%)	0	100	100
25	A4	648/776 (84%)	590 (91%)	58 (9%)	0	100	100
26	A5	504/643 (78%)	465 (92%)	39 (8%)	0	100	100
27	A8	516/713 (72%)	397 (77%)	107 (21%)	12 (2%)	6	34
28	A9	126/575 (22%)	115 (91%)	11 (9%)	0	100	100
29	AE	1496/1769 (85%)	1367 (91%)	129 (9%)	0	100	100
30	AF	489/513 (95%)	443 (91%)	46 (9%)	0	100	100
31	AG	812/896 (91%)	732 (90%)	79 (10%)	1 (0%)	51	86

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
32	B1	787/900 (87%)	732 (93%)	55 (7%)	0	100	100
33	B2	813/943 (86%)	723 (89%)	88 (11%)	2 (0%)	47	81
34	B3	733/817 (90%)	605 (82%)	126 (17%)	2 (0%)	41	77
35	B8	469/594 (79%)	440 (94%)	29 (6%)	0	100	100
36	BE	814/939 (87%)	764 (94%)	50 (6%)	0	100	100
37	B6	368/440 (84%)	342 (93%)	26 (7%)	0	100	100
38	5B	58/214 (27%)	55 (95%)	3 (5%)	0	100	100
39	5C	452/554 (82%)	419 (93%)	32 (7%)	1 (0%)	47	81
40	5D	165/250 (66%)	146 (88%)	19 (12%)	0	100	100
41	5E	187/593 (32%)	175 (94%)	10 (5%)	2 (1%)	14	52
42	5F	180/183 (98%)	164 (91%)	16 (9%)	0	100	100
43	5G	217/290 (75%)	203 (94%)	14 (6%)	0	100	100
44	5H	72/610 (12%)	65 (90%)	7 (10%)	0	100	100
45	5I	457/489 (94%)	421 (92%)	36 (8%)	0	100	100
46	5J	130/217 (60%)	121 (93%)	9 (7%)	0	100	100
47	5K	171/189 (90%)	166 (97%)	5 (3%)	0	100	100
48	RA	332/707 (47%)	276 (83%)	56 (17%)	0	100	100
49	RB	132/357 (37%)	117 (89%)	14 (11%)	1 (1%)	19	60
50	RE	1067/1237 (86%)	998 (94%)	69 (6%)	0	100	100
51	RF	233/297 (78%)	203 (87%)	30 (13%)	0	100	100
52	RG	212/252 (84%)	182 (86%)	30 (14%)	0	100	100
52	RH	226/252 (90%)	219 (97%)	7 (3%)	0	100	100
53	RJ	784/1183 (66%)	722 (92%)	61 (8%)	1 (0%)	51	86
54	RK	358/367 (98%)	341 (95%)	17 (5%)	0	100	100
55	RL	781/1056 (74%)	664 (85%)	115 (15%)	2 (0%)	41	77
55	RM	738/1056 (70%)	626 (85%)	108 (15%)	4 (0%)	29	69
56	RN	593/810 (73%)	546 (92%)	46 (8%)	1 (0%)	47	81
57	RO	523/552 (95%)	455 (87%)	68 (13%)	0	100	100
58	RP	2042/2493 (82%)	1816 (89%)	226 (11%)	0	100	100
59	RQ	267/899 (30%)	227 (85%)	40 (15%)	0	100	100
60	RS	247/480 (52%)	225 (91%)	22 (9%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
61	RY	35/534 (7%)	29 (83%)	6 (17%)	0	100	100
63	RT	206/326 (63%)	178 (86%)	27 (13%)	1 (0%)	29	69
64	ST	106/146 (73%)	89 (84%)	17 (16%)	0	100	100
65	SU	141/144 (98%)	124 (88%)	16 (11%)	1 (1%)	22	63
66	RD	310/1729 (18%)	284 (92%)	23 (7%)	3 (1%)	15	55
67	RZ	834/1267 (66%)	739 (89%)	91 (11%)	4 (0%)	29	69
All	All	25032/35454 (71%)	22530 (90%)	2459 (10%)	43 (0%)	50	81

All (43) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
27	A8	258	PRO
27	A8	309	PRO
27	A8	325	PRO
27	A8	390	PRO
27	A8	392	PRO
27	A8	446	VAL
27	A8	472	ILE
55	RL	744	PRO
55	RM	744	PRO
55	RM	905	PRO
66	RD	1223	PRO
67	RZ	583	VAL
67	RZ	676	ILE
67	RZ	682	VAL
17	SZ	51	GLU
53	RJ	82	LYS
67	RZ	1058	ILE
27	A8	235	PRO
31	AG	434	GLN
33	B2	132	THR
34	B3	91	LYS
55	RM	904	LEU
56	RN	285	PRO
65	SU	44	GLU
23	3F	552	TRP
27	A8	369	ILE
41	5E	476	MET
33	B2	118	ASN
41	5E	481	PRO

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Mol	Chain	Res	Type
49	RB	274	ILE
55	RL	743	VAL
55	RM	743	VAL
66	RD	1204	VAL
66	RD	1222	LYS
5	SF	194	THR
13	SP	123	SER
27	A8	439	LYS
34	B3	71	PRO
39	5C	16	GLU
63	RT	71	VAL
24	3G	10	PRO
27	A8	306	ILE
27	A8	339	ILE

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	
4	SC	203/224 (91%)	201 (99%)	2 (1%)	76	86
5	SF	196/222 (88%)	190 (97%)	6 (3%)	40	62
6	SG	180/191 (94%)	180 (100%)	0	100	100
7	SH	139/201 (69%)	137 (99%)	2 (1%)	67	80
8	SI	146/170 (86%)	145 (99%)	1 (1%)	84	90
9	SJ	136/161 (84%)	134 (98%)	2 (2%)	65	80
10	SK	147/166 (89%)	146 (99%)	1 (1%)	84	90
11	SM	110/136 (81%)	108 (98%)	2 (2%)	59	77
12	SO	117/128 (91%)	116 (99%)	1 (1%)	78	87
13	SP	90/105 (86%)	89 (99%)	1 (1%)	73	84
14	SR	105/119 (88%)	105 (100%)	0	100	100
15	SX	108/111 (97%)	107 (99%)	1 (1%)	78	87
16	SY	85/120 (71%)	84 (99%)	1 (1%)	71	83

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
17	SZ	85/113 (75%)	85 (100%)	0	100	100
18	Sc	69/71 (97%)	69 (100%)	0	100	100
19	Sd	56/60 (93%)	56 (100%)	0	100	100
20	3B	201/240 (84%)	201 (100%)	0	100	100
20	3C	190/240 (79%)	187 (98%)	3 (2%)	62	79
21	3D	296/435 (68%)	293 (99%)	3 (1%)	76	86
22	3E	262/433 (60%)	261 (100%)	1 (0%)	91	94
23	3F	396/503 (79%)	394 (100%)	2 (0%)	88	93
24	3G	100/104 (96%)	100 (100%)	0	100	100
24	3H	100/104 (96%)	100 (100%)	0	100	100
25	A4	591/713 (83%)	584 (99%)	7 (1%)	71	83
26	A5	433/574 (75%)	432 (100%)	1 (0%)	93	96
27	A8	174/657 (26%)	164 (94%)	10 (6%)	20	45
28	A9	89/533 (17%)	88 (99%)	1 (1%)	73	84
29	AE	708/1633 (43%)	705 (100%)	3 (0%)	91	94
30	AF	437/454 (96%)	433 (99%)	4 (1%)	78	87
31	AG	750/826 (91%)	740 (99%)	10 (1%)	69	81
32	B1	696/789 (88%)	691 (99%)	5 (1%)	84	90
33	B2	712/832 (86%)	707 (99%)	5 (1%)	84	90
34	B3	665/719 (92%)	655 (98%)	10 (2%)	65	80
35	B8	421/529 (80%)	420 (100%)	1 (0%)	93	96
36	BE	718/819 (88%)	714 (99%)	4 (1%)	86	92
37	B6	251/414 (61%)	247 (98%)	4 (2%)	62	79
38	5B	57/196 (29%)	55 (96%)	2 (4%)	36	59
39	5C	394/480 (82%)	392 (100%)	2 (0%)	88	93
40	5D	156/234 (67%)	154 (99%)	2 (1%)	69	81
41	5E	175/535 (33%)	162 (93%)	13 (7%)	13	38
42	5F	171/172 (99%)	169 (99%)	2 (1%)	71	83
43	5G	194/258 (75%)	190 (98%)	4 (2%)	53	72
44	5H	63/538 (12%)	63 (100%)	0	100	100
45	5I	416/443 (94%)	414 (100%)	2 (0%)	88	93

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
46	5J	125/200 (62%)	125 (100%)	0	100	100
47	5K	157/169 (93%)	157 (100%)	0	100	100
48	RA	303/636 (48%)	300 (99%)	3 (1%)	76	86
49	RB	117/315 (37%)	114 (97%)	3 (3%)	46	66
50	RE	984/1125 (88%)	975 (99%)	9 (1%)	78	87
51	RF	221/274 (81%)	219 (99%)	2 (1%)	78	87
52	RG	195/222 (88%)	193 (99%)	2 (1%)	76	86
52	RH	206/222 (93%)	204 (99%)	2 (1%)	76	86
53	RJ	683/1039 (66%)	676 (99%)	7 (1%)	76	86
54	RK	307/312 (98%)	303 (99%)	4 (1%)	69	81
55	RL	164/934 (18%)	162 (99%)	2 (1%)	71	83
56	RN	422/732 (58%)	421 (100%)	1 (0%)	93	96
57	RO	329/506 (65%)	328 (100%)	1 (0%)	92	95
58	RP	499/2307 (22%)	493 (99%)	6 (1%)	71	83
59	RQ	136/808 (17%)	133 (98%)	3 (2%)	52	71
60	RS	225/421 (53%)	225 (100%)	0	100	100
61	RY	31/482 (6%)	30 (97%)	1 (3%)	39	61
63	RT	158/282 (56%)	157 (99%)	1 (1%)	86	92
64	ST	98/129 (76%)	97 (99%)	1 (1%)	76	86
65	SU	115/116 (99%)	114 (99%)	1 (1%)	78	87
66	RD	226/1544 (15%)	220 (97%)	6 (3%)	44	65
67	RZ	718/1140 (63%)	713 (99%)	5 (1%)	84	90
All	All	18207/30620 (60%)	18026 (99%)	181 (1%)	77	86

All (181) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	SC	172	LEU
4	SC	205	PHE
5	SF	108	ARG
5	SF	143	ASP
5	SF	206	ASP
5	SF	207	LEU
5	SF	211	LYS

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Mol	Chain	Res	Type
5	SF	240	LYS
7	SH	71	THR
7	SH	92	ARG
8	SI	189	THR
9	SJ	165	LEU
9	SJ	195	ARG
10	SK	57	ARG
11	SM	43	LYS
11	SM	136	ARG
12	SO	87	ASP
13	SP	107	ARG
15	SX	70	ASN
16	SY	97	ASP
20	3C	237	VAL
20	3C	262	LYS
20	3C	306	LEU
21	3D	103	LYS
21	3D	129	ARG
21	3D	285	ARG
22	3E	265	PHE
23	3F	370	ARG
23	3F	506	ARG
25	A4	190	VAL
25	A4	282	ASP
25	A4	423	LYS
25	A4	436	ASP
25	A4	648	PHE
25	A4	739	LYS
25	A4	776	PHE
26	A5	434	THR
27	A8	505	LYS
27	A8	526	LEU
27	A8	536	ARG
27	A8	549	ARG
27	A8	563	LEU
27	A8	576	ARG
27	A8	633	GLN
27	A8	634	LEU
27	A8	636	GLN
27	A8	671	ARG
28	A9	483	LYS
29	AE	617	LYS

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Mol	Chain	Res	Type
29	AE	645	ARG
29	AE	699	ARG
30	AF	199	ARG
30	AF	261	VAL
30	AF	432	TYR
30	AF	508	LEU
31	AG	141	LEU
31	AG	259	VAL
31	AG	336	ARG
31	AG	368	ASP
31	AG	421	LYS
31	AG	434	GLN
31	AG	435	ASP
31	AG	436	PHE
31	AG	615	TRP
31	AG	716	ARG
32	B1	164	THR
32	B1	249	ARG
32	B1	337	TYR
32	B1	418	ARG
32	B1	519	LEU
33	B2	47	GLU
33	B2	75	ARG
33	B2	144	ASN
33	B2	576	VAL
33	B2	588	ILE
34	B3	30	LYS
34	B3	67	LEU
34	B3	95	VAL
34	B3	212	LEU
34	B3	222	LEU
34	B3	358	ASN
34	B3	533	LYS
34	B3	534	ARG
34	B3	554	ASP
34	B3	570	THR
35	B8	22	LEU
36	BE	309	ILE
36	BE	570	ILE
36	BE	728	ARG
36	BE	743	ARG
37	B6	4	THR

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Mol	Chain	Res	Type
37	B6	67	ARG
37	B6	106	ASP
37	B6	133	TYR
38	5B	158	LYS
38	5B	211	LEU
39	5C	153	THR
39	5C	392	VAL
40	5D	18	GLN
40	5D	161	ARG
41	5E	302	LYS
41	5E	345	LEU
41	5E	428	GLU
41	5E	448	LEU
41	5E	451	LEU
41	5E	494	GLU
41	5E	515	MET
41	5E	516	SER
41	5E	517	LYS
41	5E	520	LEU
41	5E	522	ARG
41	5E	537	SER
41	5E	538	LYS
42	5F	48	ASN
42	5F	75	GLU
43	5G	211	ASN
43	5G	216	LYS
43	5G	257	ARG
43	5G	282	ARG
45	5I	250	ARG
45	5I	417	ARG
48	RA	76	THR
48	RA	210	ARG
48	RA	227	ARG
49	RB	331	LYS
49	RB	338	THR
49	RB	341	ARG
50	RE	223	ARG
50	RE	227	LYS
50	RE	289	ARG
50	RE	742	PHE
50	RE	1073	ASN
50	RE	1086	ASN

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Mol	Chain	Res	Type
50	RE	1089	PHE
50	RE	1191	LYS
50	RE	1230	MET
51	RF	19	LYS
51	RF	69	LYS
52	RG	32	THR
52	RG	100	LEU
52	RH	82	ARG
52	RH	197	ASP
53	RJ	214	ARG
53	RJ	566	ARG
53	RJ	869	THR
53	RJ	973	ARG
53	RJ	976	ILE
53	RJ	1128	LYS
53	RJ	1141	LYS
54	RK	90	CYS
54	RK	214	LYS
54	RK	335	THR
54	RK	340	LYS
55	RL	9	ARG
55	RL	83	ARG
56	RN	766	ARG
57	RO	493	TYR
58	RP	201	ARG
58	RP	1749	LYS
58	RP	1770	LEU
58	RP	1813	LYS
58	RP	1815	CYS
58	RP	1896	ILE
59	RQ	330	THR
59	RQ	898	PHE
59	RQ	899	LYS
61	RY	487	ASP
63	RT	234	LEU
64	ST	55	HIS
65	SU	108	LEU
66	RD	1466	ARG
66	RD	1521	LEU
66	RD	1668	LYS
66	RD	1670	LYS
66	RD	1686	LYS

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Mol	Chain	Res	Type
66	RD	1706	LYS
67	RZ	386	LYS
67	RZ	452	ARG
67	RZ	584	ASP
67	RZ	586	ARG
67	RZ	1109	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (305) such sidechains are listed below:

Mol	Chain	Res	Type
4	SC	74	GLN
4	SC	92	GLN
4	SC	101	HIS
4	SC	194	ASN
6	SG	63	GLN
6	SG	104	ASN
6	SG	169	ASN
6	SG	186	ASN
7	SH	140	ASN
7	SH	201	GLN
8	SI	29	ASN
8	SI	42	GLN
8	SI	170	GLN
9	SJ	32	GLN
9	SJ	84	HIS
9	SJ	103	GLN
9	SJ	159	GLN
11	SM	81	HIS
13	SP	12	GLN
14	SR	32	ASN
14	SR	74	HIS
15	SX	12	ASN
15	SX	16	ASN
18	Sc	42	ASN
20	3B	91	HIS
20	3B	183	HIS
20	3B	258	HIS
21	3D	39	ASN
21	3D	85	ASN
21	3D	168	GLN
21	3D	213	ASN
22	3E	191	HIS

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Mol	Chain	Res	Type
22	3E	256	ASN
22	3E	286	ASN
22	3E	289	GLN
22	3E	400	GLN
23	3F	155	ASN
23	3F	235	HIS
23	3F	525	GLN
23	3F	561	ASN
24	3G	19	GLN
24	3G	29	ASN
24	3G	38	ASN
24	3H	5	ASN
24	3H	18	GLN
24	3H	45	ASN
25	A4	53	HIS
25	A4	179	HIS
25	A4	274	GLN
25	A4	279	HIS
25	A4	292	ASN
25	A4	317	ASN
25	A4	426	GLN
25	A4	438	GLN
25	A4	452	HIS
25	A4	529	ASN
25	A4	589	ASN
26	A5	32	GLN
26	A5	67	ASN
26	A5	115	ASN
26	A5	293	ASN
26	A5	302	ASN
26	A5	316	ASN
26	A5	324	ASN
26	A5	333	ASN
26	A5	443	GLN
27	A8	588	GLN
28	A9	478	ASN
28	A9	509	GLN
29	AE	14	ASN
29	AE	141	ASN
29	AE	166	ASN
29	AE	219	ASN
29	AE	224	ASN

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Mol	Chain	Res	Type
29	AE	258	HIS
29	AE	477	ASN
29	AE	480	ASN
29	AE	545	ASN
29	AE	673	ASN
29	AE	730	GLN
30	AF	48	ASN
30	AF	64	GLN
30	AF	125	HIS
30	AF	133	HIS
30	AF	156	ASN
30	AF	289	ASN
30	AF	481	GLN
31	AG	50	ASN
31	AG	105	HIS
31	AG	190	GLN
31	AG	266	ASN
31	AG	269	GLN
31	AG	325	GLN
31	AG	332	GLN
31	AG	370	GLN
31	AG	375	ASN
31	AG	393	ASN
31	AG	407	ASN
31	AG	410	ASN
31	AG	453	HIS
31	AG	467	GLN
31	AG	489	ASN
31	AG	568	ASN
31	AG	579	ASN
31	AG	605	ASN
31	AG	669	ASN
31	AG	706	HIS
31	AG	881	ASN
32	B1	92	HIS
32	B1	142	HIS
32	B1	190	HIS
32	B1	201	HIS
32	B1	297	GLN
32	B1	303	ASN
32	B1	349	ASN
32	B1	386	HIS

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Mol	Chain	Res	Type
32	B1	452	ASN
32	B1	456	HIS
32	B1	483	GLN
32	B1	549	GLN
32	B1	552	ASN
32	B1	795	ASN
32	B1	813	HIS
32	B1	837	ASN
32	B1	842	ASN
33	B2	172	GLN
33	B2	390	GLN
33	B2	455	GLN
33	B2	524	HIS
33	B2	596	ASN
33	B2	628	HIS
33	B2	629	ASN
33	B2	657	GLN
33	B2	770	ASN
33	B2	791	ASN
33	B2	856	ASN
33	B2	879	GLN
34	B3	157	ASN
34	B3	241	GLN
34	B3	337	HIS
34	B3	387	HIS
34	B3	519	ASN
34	B3	667	GLN
34	B3	753	HIS
34	B3	767	HIS
34	B3	792	HIS
35	B8	162	ASN
35	B8	167	GLN
35	B8	224	ASN
35	B8	282	ASN
35	B8	311	ASN
35	B8	352	GLN
35	B8	472	GLN
35	B8	492	ASN
35	B8	528	GLN
35	B8	592	ASN
36	BE	163	GLN
36	BE	289	ASN

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Mol	Chain	Res	Type
36	BE	481	ASN
36	BE	501	HIS
36	BE	514	ASN
36	BE	627	ASN
36	BE	708	ASN
36	BE	877	ASN
36	BE	911	ASN
36	BE	916	HIS
37	B6	90	GLN
37	B6	115	ASN
37	B6	166	ASN
37	B6	287	ASN
38	5B	207	ASN
39	5C	101	ASN
39	5C	124	HIS
39	5C	133	HIS
39	5C	151	ASN
39	5C	164	GLN
39	5C	170	GLN
39	5C	371	HIS
39	5C	394	HIS
40	5D	18	GLN
40	5D	42	HIS
40	5D	68	HIS
40	5D	144	ASN
40	5D	153	ASN
41	5E	303	GLN
41	5E	434	HIS
41	5E	486	ASN
41	5E	493	GLN
42	5F	7	HIS
42	5F	48	ASN
42	5F	144	ASN
42	5F	153	ASN
43	5G	118	ASN
43	5G	145	HIS
43	5G	211	ASN
43	5G	235	GLN
44	5H	560	ASN
45	5I	20	GLN
45	5I	46	ASN
45	5I	109	HIS

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Mol	Chain	Res	Type
45	5I	134	ASN
45	5I	242	ASN
45	5I	260	GLN
45	5I	336	HIS
45	5I	371	ASN
45	5I	406	HIS
45	5I	460	GLN
46	5J	135	HIS
46	5J	184	ASN
47	5K	29	GLN
47	5K	43	ASN
48	RA	82	HIS
48	RA	96	HIS
48	RA	119	ASN
48	RA	147	ASN
48	RA	230	GLN
48	RA	268	GLN
48	RA	282	ASN
48	RA	339	HIS
49	RB	314	ASN
49	RB	318	ASN
50	RE	170	GLN
50	RE	293	ASN
50	RE	409	ASN
50	RE	506	GLN
50	RE	520	ASN
50	RE	537	ASN
50	RE	568	ASN
50	RE	602	ASN
50	RE	834	ASN
50	RE	841	ASN
50	RE	872	ASN
50	RE	969	ASN
50	RE	1029	ASN
50	RE	1033	ASN
50	RE	1073	ASN
50	RE	1078	HIS
50	RE	1086	ASN
50	RE	1194	HIS
50	RE	1203	ASN
50	RE	1228	ASN
51	RF	23	HIS

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Mol	Chain	Res	Type
51	RF	73	GLN
51	RF	90	ASN
51	RF	135	ASN
51	RF	136	ASN
51	RF	187	HIS
51	RF	197	GLN
52	RG	105	ASN
52	RG	125	ASN
52	RH	69	ASN
52	RH	125	ASN
52	RH	250	ASN
53	RJ	157	ASN
53	RJ	254	HIS
53	RJ	276	HIS
53	RJ	289	HIS
53	RJ	778	GLN
53	RJ	1082	GLN
54	RK	16	ASN
54	RK	334	ASN
55	RL	16	ASN
55	RL	75	ASN
55	RL	133	ASN
56	RN	8	ASN
56	RN	56	ASN
56	RN	89	GLN
56	RN	482	GLN
56	RN	703	GLN
56	RN	771	ASN
56	RN	797	ASN
57	RO	192	GLN
57	RO	266	ASN
57	RO	268	GLN
57	RO	273	GLN
57	RO	304	ASN
57	RO	306	GLN
57	RO	343	GLN
57	RO	434	ASN
57	RO	472	HIS
57	RO	474	HIS
58	RP	58	ASN
58	RP	1686	GLN
58	RP	1707	HIS

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Mol	Chain	Res	Type
58	RP	1785	ASN
58	RP	1787	ASN
58	RP	1802	HIS
58	RP	1816	HIS
59	RQ	303	GLN
59	RQ	310	HIS
59	RQ	344	GLN
59	RQ	867	GLN
59	RQ	876	GLN
63	RT	123	HIS
64	ST	122	HIS
65	SU	43	ASN
65	SU	48	GLN
66	RD	1485	GLN
66	RD	1522	ASN
66	RD	1525	ASN
67	RZ	385	GLN
67	RZ	794	GLN
67	RZ	884	GLN
67	RZ	1114	ASN
67	RZ	1232	ASN

5.3.3 RNA [i](#)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	3A	169/333 (50%)	55 (32%)	8 (4%)
2	5A	186/700 (26%)	54 (29%)	4 (2%)
3	SA	1310/1812 (72%)	499 (38%)	32 (2%)
All	All	1665/2845 (58%)	608 (36%)	44 (2%)

All (608) RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	3A	2	U
1	3A	14	A
1	3A	15	U
1	3A	24	U
1	3A	25	U
1	3A	27	U
1	3A	28	A
1	3A	30	A

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Mol	Chain	Res	Type
1	3A	33	A
1	3A	35	U
1	3A	38	U
1	3A	56	A
1	3A	60	A
1	3A	61	G
1	3A	87	G
1	3A	88	U
1	3A	89	C
1	3A	90	C
1	3A	91	C
1	3A	97	C
1	3A	98	U
1	3A	99	U
1	3A	101	G
1	3A	103	A
1	3A	111	G
1	3A	115	G
1	3A	198	U
1	3A	199	G
1	3A	201	C
1	3A	204	U
1	3A	205	G
1	3A	206	C
1	3A	246	A
1	3A	248	G
1	3A	249	G
1	3A	252	C
1	3A	264	C
1	3A	267	A
1	3A	305	G
1	3A	310	G
1	3A	311	G
1	3A	313	A
1	3A	314	C
1	3A	317	A
1	3A	318	U
1	3A	319	G
1	3A	320	G
1	3A	321	C
1	3A	322	A
1	3A	323	G

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Mol	Chain	Res	Type
1	3A	324	U
1	3A	325	C
1	3A	328	A
1	3A	329	C
1	3A	332	G
2	5A	5	G
2	5A	6	A
2	5A	7	A
2	5A	8	A
2	5A	11	A
2	5A	13	U
2	5A	14	U
2	5A	15	G
2	5A	63	G
2	5A	64	U
2	5A	70	A
2	5A	83	U
2	5A	86	C
2	5A	87	C
2	5A	90	G
2	5A	279	A
2	5A	280	A
2	5A	281	G
2	5A	292	A
2	5A	294	U
2	5A	304	U
2	5A	305	A
2	5A	309	A
2	5A	310	U
2	5A	311	C
2	5A	312	U
2	5A	313	A
2	5A	468	A
2	5A	472	A
2	5A	474	A
2	5A	481	U
2	5A	482	A
2	5A	485	G
2	5A	487	A
2	5A	488	U
2	5A	490	G
2	5A	491	U

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Mol	Chain	Res	Type
2	5A	493	A
2	5A	519	A
2	5A	525	U
2	5A	526	U
2	5A	536	A
2	5A	537	G
2	5A	539	A
2	5A	540	U
2	5A	541	U
2	5A	542	U
2	5A	548	A
2	5A	549	G
2	5A	583	U
2	5A	586	A
2	5A	587	G
2	5A	589	U
2	5A	591	U
3	SA	-6	A
3	SA	-5	G
3	SA	-4	A
3	SA	-1	G
3	SA	0	U
3	SA	1	U
3	SA	2	A
3	SA	17	C
3	SA	18	C
3	SA	19	A
3	SA	21	U
3	SA	23	G
3	SA	25	C
3	SA	26	A
3	SA	29	U
3	SA	35	U
3	SA	36	C
3	SA	37	U
3	SA	50	C
3	SA	51	A
3	SA	52	U
3	SA	53	G
3	SA	55	A
3	SA	56	U
3	SA	57	G

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Mol	Chain	Res	Type
3	SA	60	U
3	SA	61	A
3	SA	63	G
3	SA	65	A
3	SA	66	U
3	SA	67	A
3	SA	68	A
3	SA	69	G
3	SA	72	A
3	SA	73	U
3	SA	74	U
3	SA	75	U
3	SA	77	U
3	SA	81	G
3	SA	85	A
3	SA	92	A
3	SA	96	G
3	SA	97	C
3	SA	100	A
3	SA	102	U
3	SA	103	A
3	SA	104	A
3	SA	105	A
3	SA	106	U
3	SA	114	C
3	SA	115	G
3	SA	116	U
3	SA	119	A
3	SA	127	G
3	SA	128	U
3	SA	129	U
3	SA	130	C
3	SA	131	C
3	SA	141	U
3	SA	145	A
3	SA	146	U
3	SA	147	A
3	SA	149	C
3	SA	153	G
3	SA	159	U
3	SA	160	C
3	SA	161	U

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Mol	Chain	Res	Type
3	SA	168	A
3	SA	174	U
3	SA	175	G
3	SA	176	C
3	SA	177	U
3	SA	182	A
3	SA	183	U
3	SA	184	C
3	SA	187	G
3	SA	188	A
3	SA	190	C
3	SA	191	C
3	SA	192	U
3	SA	193	U
3	SA	194	U
3	SA	195	G
3	SA	197	A
3	SA	202	A
3	SA	203	U
3	SA	204	G
3	SA	206	A
3	SA	210	A
3	SA	211	U
3	SA	214	G
3	SA	226	A
3	SA	228	G
3	SA	230	C
3	SA	233	C
3	SA	234	G
3	SA	236	A
3	SA	237	C
3	SA	238	U
3	SA	239	C
3	SA	240	U
3	SA	241	U
3	SA	242	U
3	SA	243	G
3	SA	254	A
3	SA	256	A
3	SA	258	C
3	SA	261	U
3	SA	262	U

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Mol	Chain	Res	Type
3	SA	265	A
3	SA	266	A
3	SA	267	U
3	SA	272	U
3	SA	273	G
3	SA	275	C
3	SA	276	C
3	SA	277	U
3	SA	278	U
3	SA	279	G
3	SA	280	U
3	SA	281	G
3	SA	283	U
3	SA	290	G
3	SA	308	C
3	SA	309	C
3	SA	311	U
3	SA	312	A
3	SA	316	A
3	SA	319	U
3	SA	320	U
3	SA	321	C
3	SA	324	U
3	SA	325	G
3	SA	333	A
3	SA	334	G
3	SA	337	G
3	SA	338	C
3	SA	350	U
3	SA	352	A
3	SA	355	G
3	SA	357	G
3	SA	359	A
3	SA	360	A
3	SA	361	C
3	SA	362	G
3	SA	365	G
3	SA	366	A
3	SA	369	A
3	SA	371	G
3	SA	373	G
3	SA	374	U

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Mol	Chain	Res	Type
3	SA	375	U
3	SA	377	G
3	SA	379	U
3	SA	382	C
3	SA	383	G
3	SA	386	G
3	SA	387	A
3	SA	390	G
3	SA	400	A
3	SA	401	A
3	SA	402	C
3	SA	403	G
3	SA	411	C
3	SA	416	A
3	SA	417	A
3	SA	418	G
3	SA	419	G
3	SA	421	A
3	SA	422	G
3	SA	423	G
3	SA	424	C
3	SA	425	A
3	SA	426	G
3	SA	429	G
3	SA	436	A
3	SA	437	A
3	SA	439	U
3	SA	440	U
3	SA	441	A
3	SA	444	C
3	SA	445	A
3	SA	448	C
3	SA	454	U
3	SA	455	C
3	SA	456	A
3	SA	457	G
3	SA	468	A
3	SA	469	C
3	SA	470	A
3	SA	471	A
3	SA	473	A
3	SA	477	A

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Mol	Chain	Res	Type
3	SA	480	G
3	SA	486	G
3	SA	487	G
3	SA	496	G
3	SA	501	U
3	SA	502	U
3	SA	505	A
3	SA	506	A
3	SA	514	G
3	SA	520	A
3	SA	534	A
3	SA	538	A
3	SA	539	G
3	SA	541	A
3	SA	542	A
3	SA	543	C
3	SA	545	A
3	SA	557	G
3	SA	558	U
3	SA	563	U
3	SA	564	G
3	SA	565	C
3	SA	570	A
3	SA	572	C
3	SA	574	G
3	SA	575	C
3	SA	578	U
3	SA	579	A
3	SA	580	A
3	SA	583	C
3	SA	584	C
3	SA	585	A
3	SA	586	G
3	SA	587	C
3	SA	594	A
3	SA	595	G
3	SA	602	U
3	SA	603	U
3	SA	604	A
3	SA	606	A
3	SA	608	U
3	SA	609	U

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Mol	Chain	Res	Type
3	SA	610	G
3	SA	611	U
3	SA	612	U
3	SA	613	G
3	SA	614	C
3	SA	615	A
3	SA	616	G
3	SA	635	A
3	SA	636	A
3	SA	638	U
3	SA	644	C
3	SA	648	G
3	SA	652	G
3	SA	654	C
3	SA	656	G
3	SA	657	U
3	SA	658	C
3	SA	677	G
3	SA	678	A
3	SA	686	C
3	SA	687	G
3	SA	688	G
3	SA	689	G
3	SA	691	C
3	SA	692	C
3	SA	827	C
3	SA	828	U
3	SA	840	U
3	SA	841	U
3	SA	848	C
3	SA	859	A
3	SA	860	U
3	SA	863	A
3	SA	864	U
3	SA	865	A
3	SA	873	U
3	SA	877	G
3	SA	894	U
3	SA	901	G
3	SA	904	G
3	SA	906	A
3	SA	912	U

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Mol	Chain	Res	Type
3	SA	913	G
3	SA	914	G
3	SA	926	A
3	SA	930	A
3	SA	933	A
3	SA	934	C
3	SA	935	U
3	SA	945	U
3	SA	951	A
3	SA	953	G
3	SA	960	U
3	SA	966	A
3	SA	969	C
3	SA	970	A
3	SA	1037	C
3	SA	1039	A
3	SA	1040	G
3	SA	1052	U
3	SA	1053	G
3	SA	1056	U
3	SA	1057	U
3	SA	1059	U
3	SA	1060	U
3	SA	1062	A
3	SA	1063	U
3	SA	1076	A
3	SA	1079	U
3	SA	1081	A
3	SA	1082	C
3	SA	1084	A
3	SA	1085	G
3	SA	1086	A
3	SA	1106	U
3	SA	1107	G
3	SA	1108	G
3	SA	1109	G
3	SA	1110	G
3	SA	1111	G
3	SA	1114	G
3	SA	1118	G
3	SA	1119	G
3	SA	1122	G

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Mol	Chain	Res	Type
3	SA	1125	A
3	SA	1126	G
3	SA	1127	G
3	SA	1128	C
3	SA	1129	U
3	SA	1131	A
3	SA	1132	A
3	SA	1145	U
3	SA	1146	G
3	SA	1158	C
3	SA	1164	G
3	SA	1178	G
3	SA	1191	U
3	SA	1192	C
3	SA	1193	A
3	SA	1195	C
3	SA	1196	A
3	SA	1197	C
3	SA	1198	G
3	SA	1199	G
3	SA	1200	G
3	SA	1201	G
3	SA	1202	A
3	SA	1205	C
3	SA	1206	U
3	SA	1208	A
3	SA	1210	C
3	SA	1213	G
3	SA	1217	A
3	SA	1218	G
3	SA	1219	A
3	SA	1220	C
3	SA	1223	A
3	SA	1227	A
3	SA	1228	G
3	SA	1229	G
3	SA	1230	A
3	SA	1232	U
3	SA	1233	G
3	SA	1235	C
3	SA	1236	A
3	SA	1252	C

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Mol	Chain	Res	Type
3	SA	1253	U
3	SA	1254	U
3	SA	1255	G
3	SA	1258	U
3	SA	1263	G
3	SA	1266	U
3	SA	1268	G
3	SA	1271	G
3	SA	1272	U
3	SA	1273	G
3	SA	1275	A
3	SA	1276	U
3	SA	1436	A
3	SA	1440	C
3	SA	1441	C
3	SA	1442	U
3	SA	1443	U
3	SA	1449	U
3	SA	1450	U
3	SA	1453	G
3	SA	1457	C
3	SA	1461	C
3	SA	1469	A
3	SA	1472	C
3	SA	1473	U
3	SA	1474	G
3	SA	1475	A
3	SA	1476	C
3	SA	1482	C
3	SA	1487	A
3	SA	1488	G
3	SA	1489	U
3	SA	1490	C
3	SA	1491	U
3	SA	1492	A
3	SA	1493	C
3	SA	1522	U
3	SA	1523	G
3	SA	1524	A
3	SA	1527	C
3	SA	1531	G
3	SA	1532	U

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Mol	Chain	Res	Type
3	SA	1533	C
3	SA	1534	G
3	SA	1535	U
3	SA	1536	G
3	SA	1537	C
3	SA	1538	U
3	SA	1539	G
3	SA	1540	G
3	SA	1541	G
3	SA	1542	G
3	SA	1553	G
3	SA	1554	U
3	SA	1555	A
3	SA	1556	A
3	SA	1557	U
3	SA	1559	A
3	SA	1560	U
3	SA	1561	U
3	SA	1569	A
3	SA	1573	A
3	SA	1574	G
3	SA	1582	U
3	SA	1584	G
3	SA	1590	G
3	SA	1594	G
3	SA	1595	U
3	SA	1596	C
3	SA	1601	G
3	SA	1602	C
3	SA	1607	G
3	SA	1614	A
3	SA	1618	C
3	SA	1628	U
3	SA	1630	U
3	SA	1633	A
3	SA	1651	A
3	SA	1655	A
3	SA	1657	U
3	SA	1658	G
3	SA	1659	A
3	SA	1661	U
3	SA	1665	U

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Mol	Chain	Res	Type
3	SA	1670	G
3	SA	1675	C
3	SA	1677	C
3	SA	1679	G
3	SA	1680	G
3	SA	1681	A
3	SA	1682	U
3	SA	1683	C
3	SA	1687	U
3	SA	1689	A
3	SA	1692	G
3	SA	1693	A
3	SA	1696	G
3	SA	1697	G
3	SA	1700	C
3	SA	1708	U
3	SA	1709	C
3	SA	1710	U
3	SA	1711	C
3	SA	1713	G
3	SA	1717	G
3	SA	1718	G
3	SA	1719	A
3	SA	1721	A
3	SA	1724	U
3	SA	1725	U
3	SA	1727	G
3	SA	1728	A
3	SA	1731	A
3	SA	1732	A
3	SA	1736	G
3	SA	1737	G
3	SA	1742	U
3	SA	1743	U
3	SA	1745	G
3	SA	1749	A
3	SA	1750	A
3	SA	1755	A
3	SA	1756	A
3	SA	1757	G
3	SA	1758	U
3	SA	1778	G

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Mol	Chain	Res	Type
3	SA	1790	A
3	SA	1791	A
3	SA	1792	G
3	SA	1793	G
3	SA	1794	A
3	SA	1795	U
3	SA	1799	U
3	SA	1800	A
3	SA	1801	A
3	SA	1802	A
3	SA	1803	G
3	SA	1804	A

All (44) RNA pucker outliers are listed below:

Mol	Chain	Res	Type
1	3A	97	C
1	3A	98	U
1	3A	198	U
1	3A	248	G
1	3A	312	U
1	3A	318	U
1	3A	322	A
1	3A	323	G
2	5A	312	U
2	5A	487	A
2	5A	492	G
2	5A	536	A
3	SA	-7	A
3	SA	0	U
3	SA	56	U
3	SA	68	A
3	SA	272	U
3	SA	372	G
3	SA	401	A
3	SA	417	A
3	SA	538	A
3	SA	542	A
3	SA	579	A
3	SA	602	U
3	SA	1052	U
3	SA	1084	A

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Mol	Chain	Res	Type
3	SA	1197	C
3	SA	1474	G
3	SA	1475	A
3	SA	1486	G
3	SA	1487	A
3	SA	1490	C
3	SA	1521	G
3	SA	1531	G
3	SA	1532	U
3	SA	1533	C
3	SA	1539	G
3	SA	1540	G
3	SA	1541	G
3	SA	1568	C
3	SA	1573	A
3	SA	1594	G
3	SA	1632	C
3	SA	1803	G

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

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

5.5 Carbohydrates [i](#)

There are no monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 5 ligands modelled in this entry, 3 are monoatomic - leaving 2 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
69	GTP	RJ	1201	70	26,34,34	0.94	2 (7%)	32,54,54	0.92	0
71	ADP	RZ	1301	-	24,29,29	0.95	1 (4%)	29,45,45	1.37	4 (13%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
69	GTP	RJ	1201	70	-	3/18/38/38	0/3/3/3
71	ADP	RZ	1301	-	-	4/12/32/32	0/3/3/3

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
69	RJ	1201	GTP	C5-C6	-2.50	1.42	1.47
71	RZ	1301	ADP	C5-C4	2.43	1.47	1.40
69	RJ	1201	GTP	C8-N7	-2.03	1.31	1.35

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
71	RZ	1301	ADP	N3-C2-N1	-3.42	123.33	128.68
71	RZ	1301	ADP	C3'-C2'-C1'	3.02	105.53	100.98
71	RZ	1301	ADP	C4-C5-N7	-2.90	106.37	109.40
71	RZ	1301	ADP	PA-O3A-PB	-2.26	125.09	132.83

There are no chirality outliers.

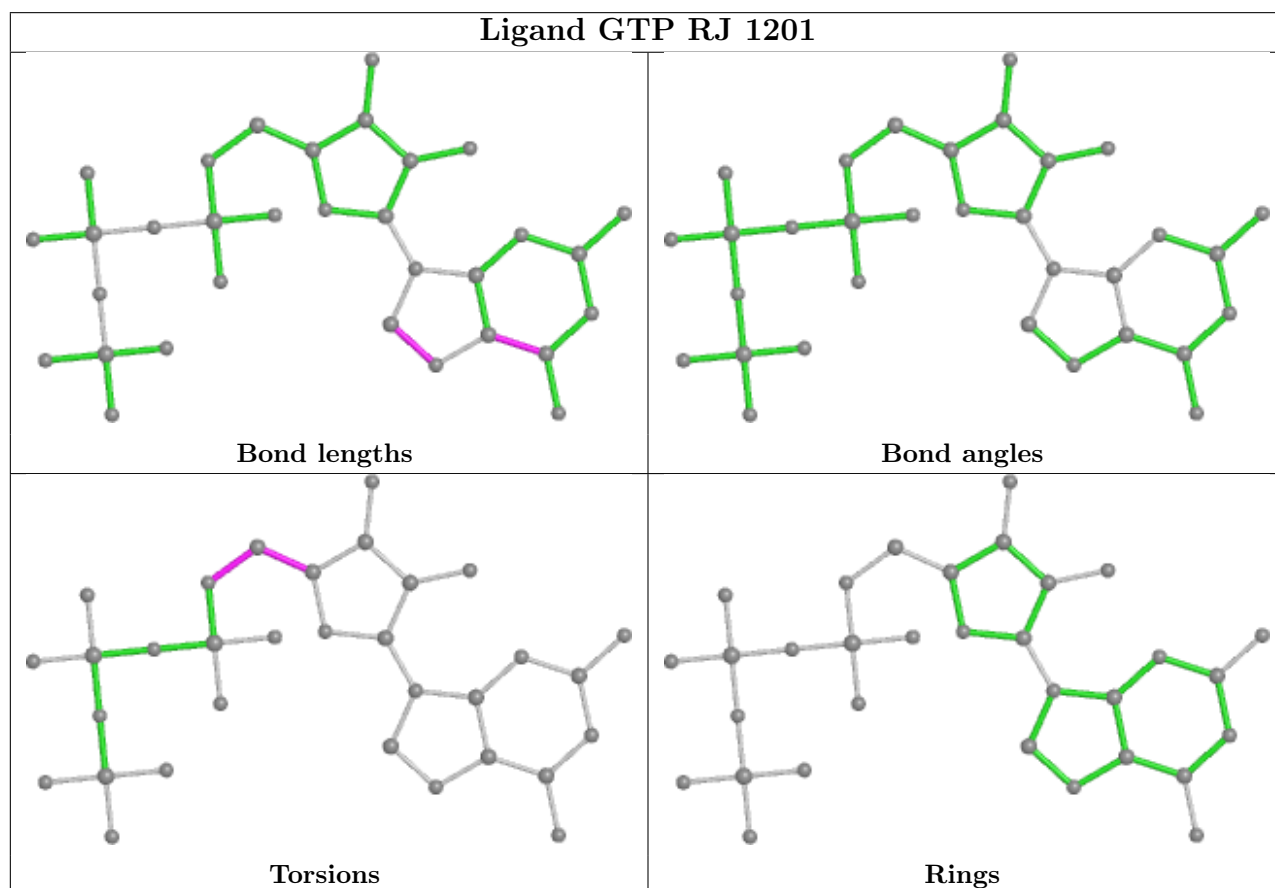
All (7) torsion outliers are listed below:

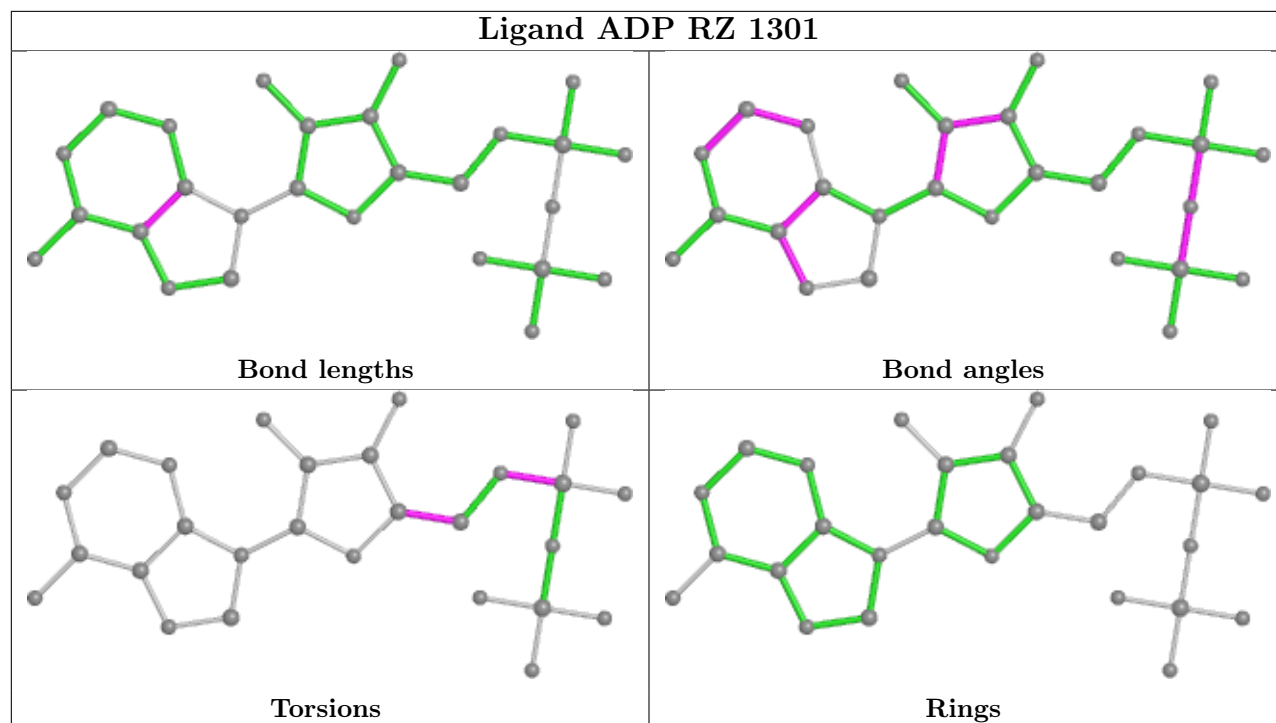
Mol	Chain	Res	Type	Atoms
71	RZ	1301	ADP	C5'-O5'-PA-O2A
71	RZ	1301	ADP	C5'-O5'-PA-O3A
69	RJ	1201	GTP	O4'-C4'-C5'-O5'
69	RJ	1201	GTP	C3'-C4'-C5'-O5'
69	RJ	1201	GTP	C4'-C5'-O5'-PA
71	RZ	1301	ADP	O4'-C4'-C5'-O5'
71	RZ	1301	ADP	C3'-C4'-C5'-O5'

There are no ring outliers.

No monomer is involved in short contacts.

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





5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

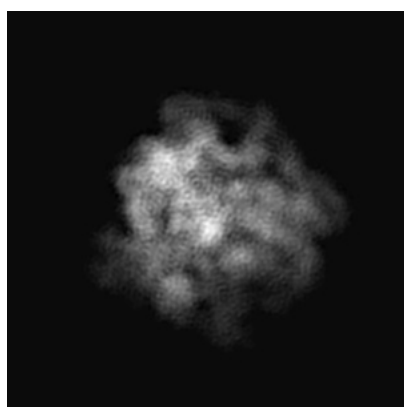
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-30588. These allow visual inspection of the internal detail of the map and identification of artifacts.

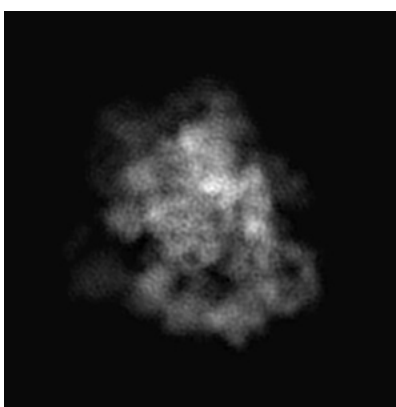
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

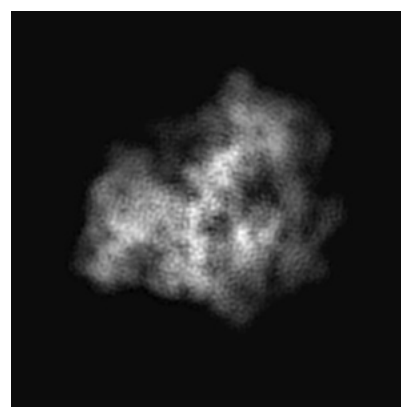
6.1.1 Primary map



X



Y

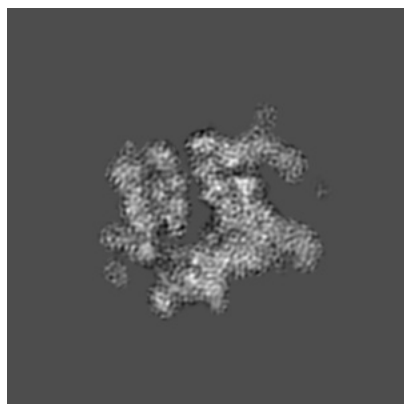


Z

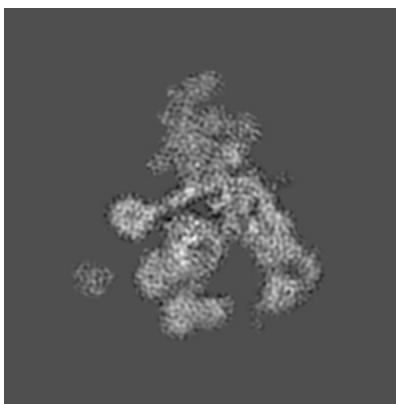
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

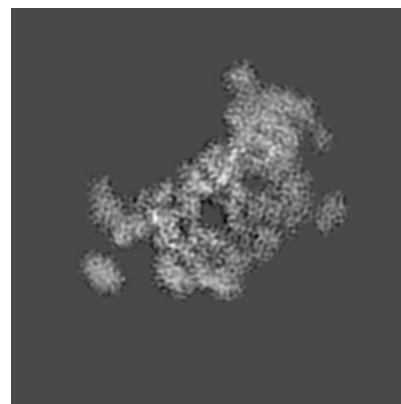
6.2.1 Primary map



X Index: 200



Y Index: 200

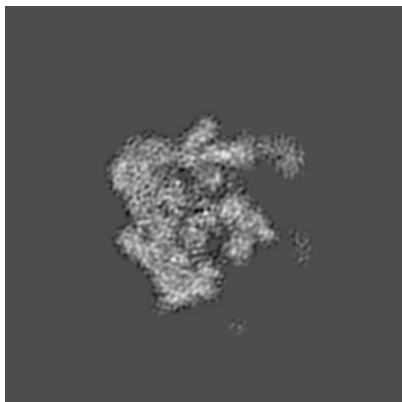


Z Index: 200

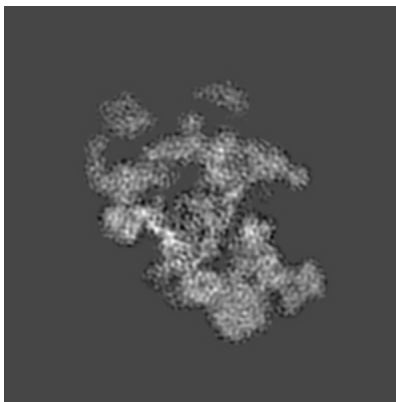
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

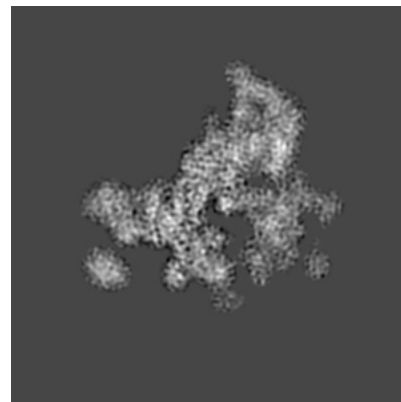
6.3.1 Primary map



X Index: 185



Y Index: 174



Z Index: 185

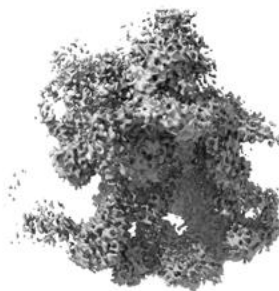
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal surface views [i](#)

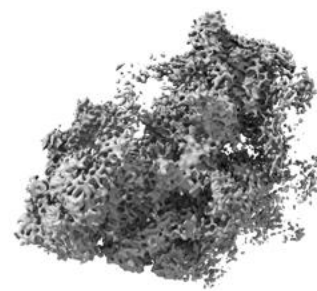
6.4.1 Primary map



X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.01. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

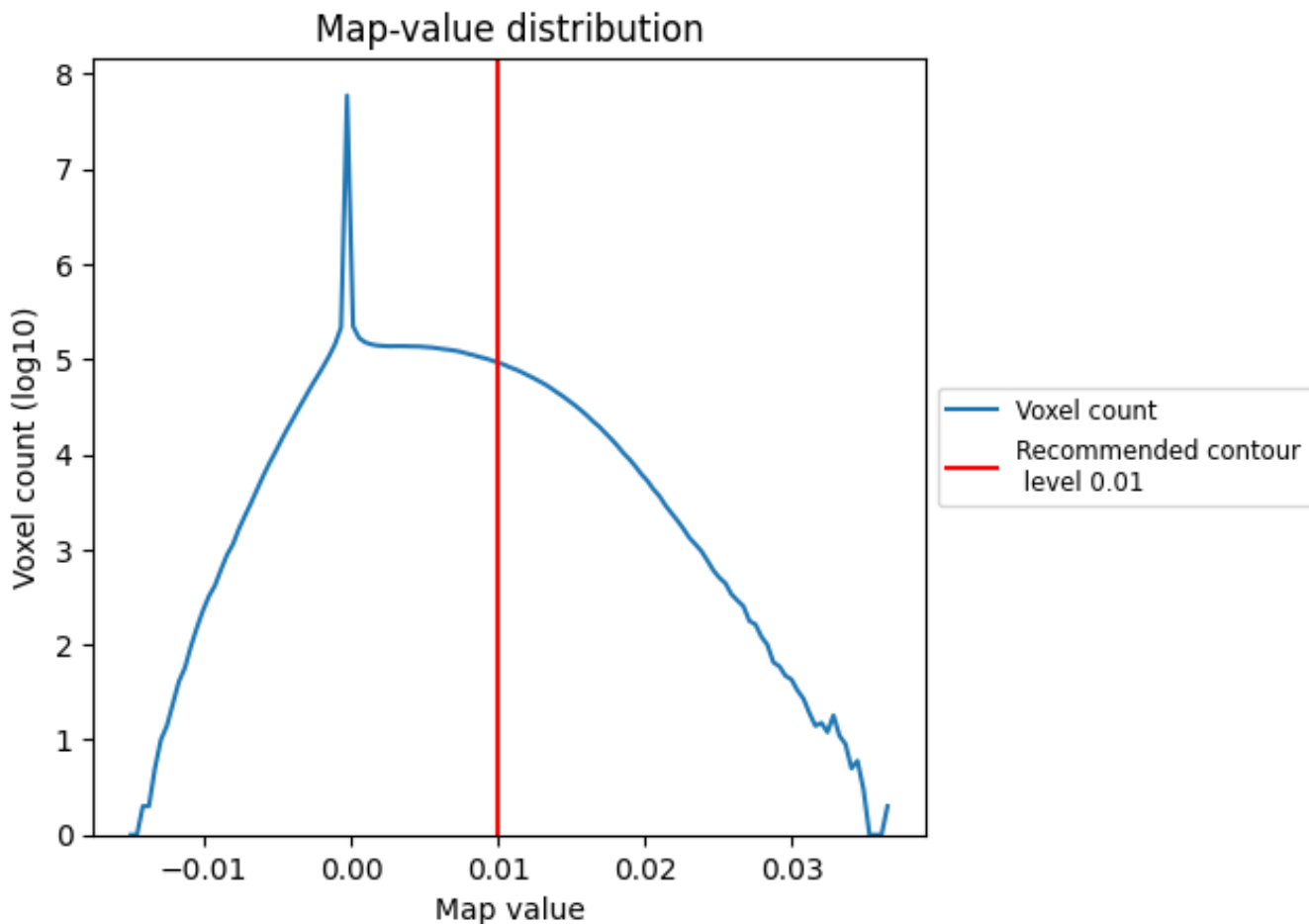
6.5 Mask visualisation

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

7 Map analysis [i](#)

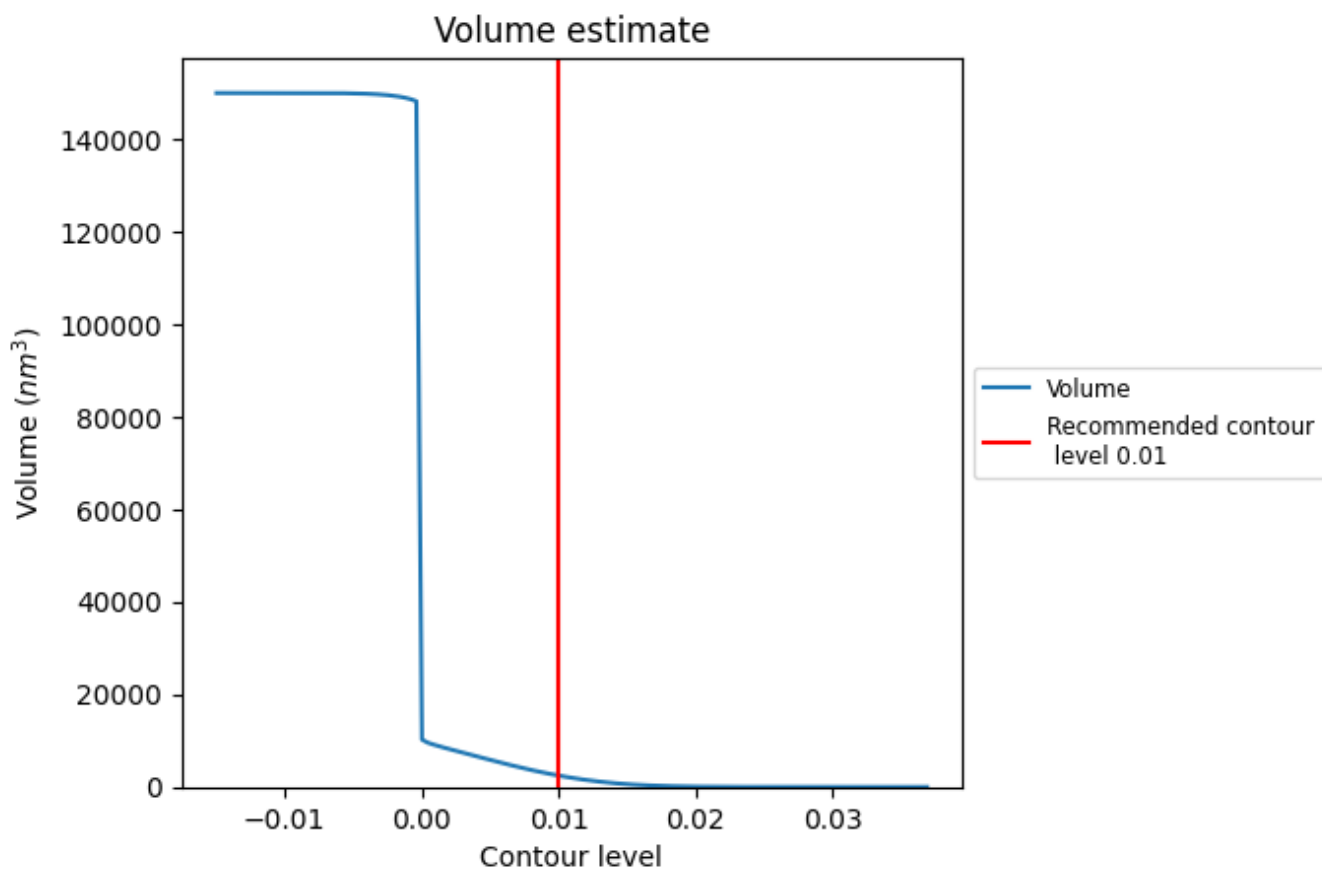
This section contains the results of statistical analysis of the map.

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.

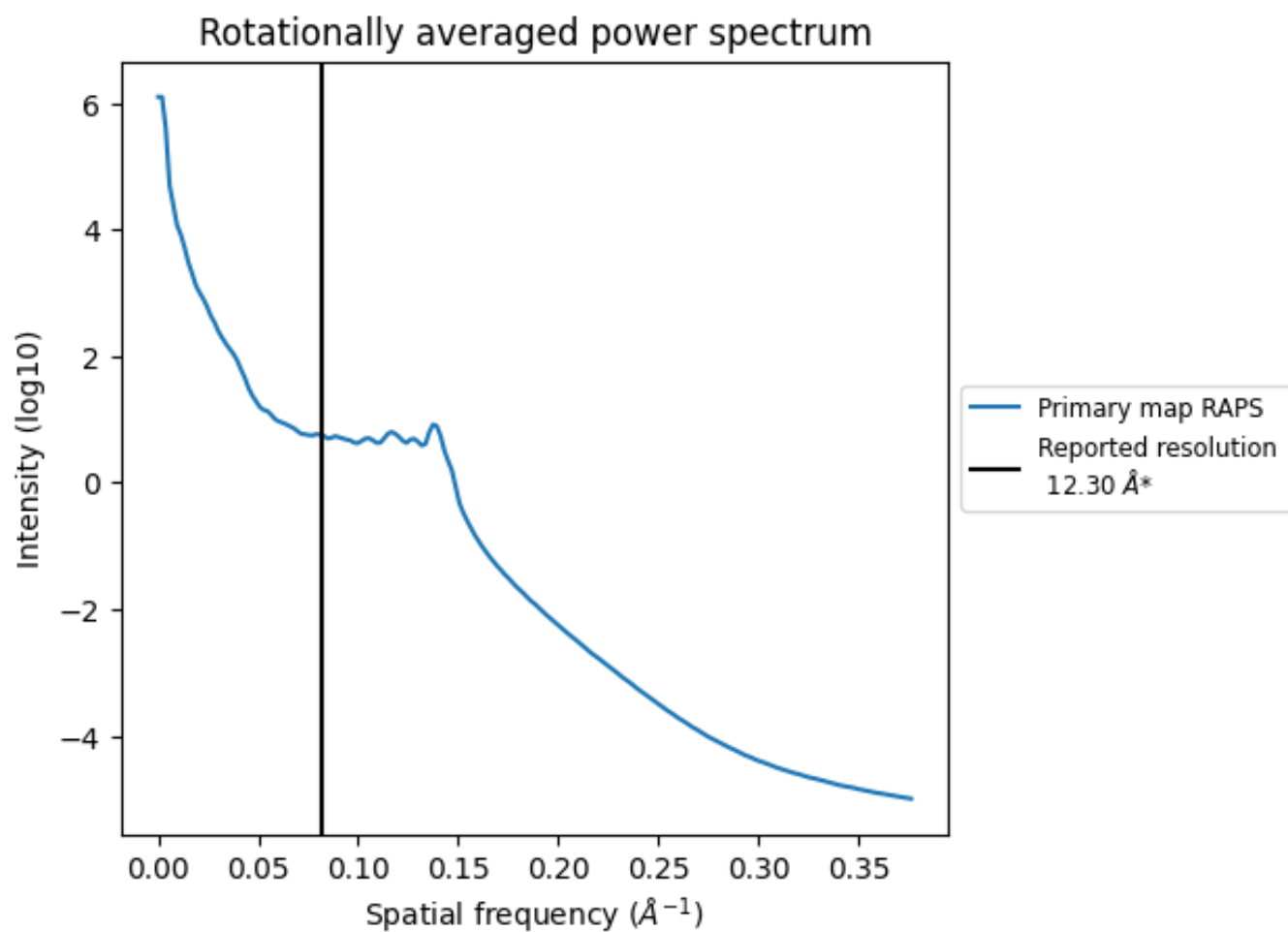
7.2 Volume estimate [\(i\)](#)



The volume at the recommended contour level is 2465 nm^3 ; this corresponds to an approximate mass of 2227 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 0.081\AA^{-1}

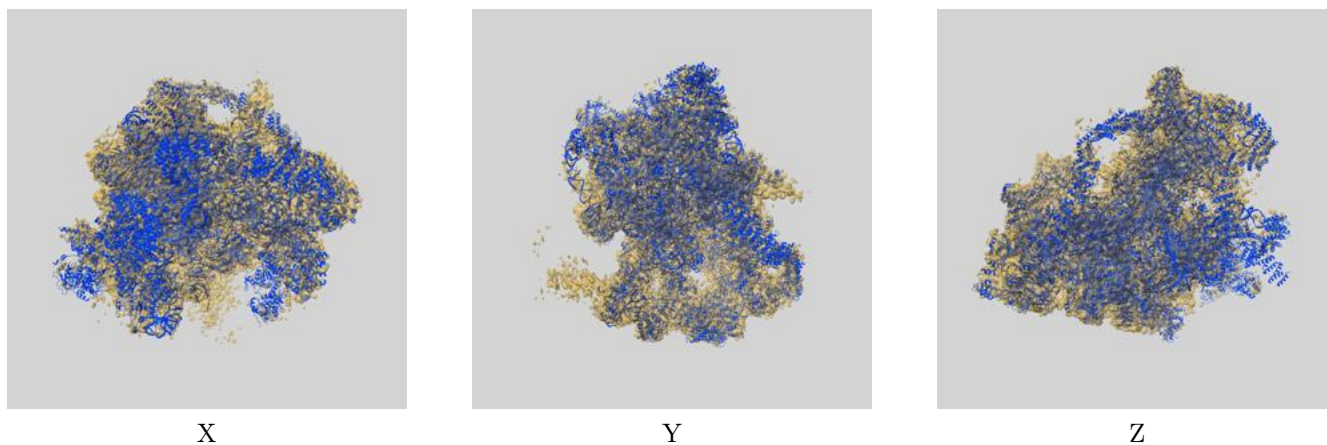
8 Fourier-Shell correlation

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

9 Map-model fit [i](#)

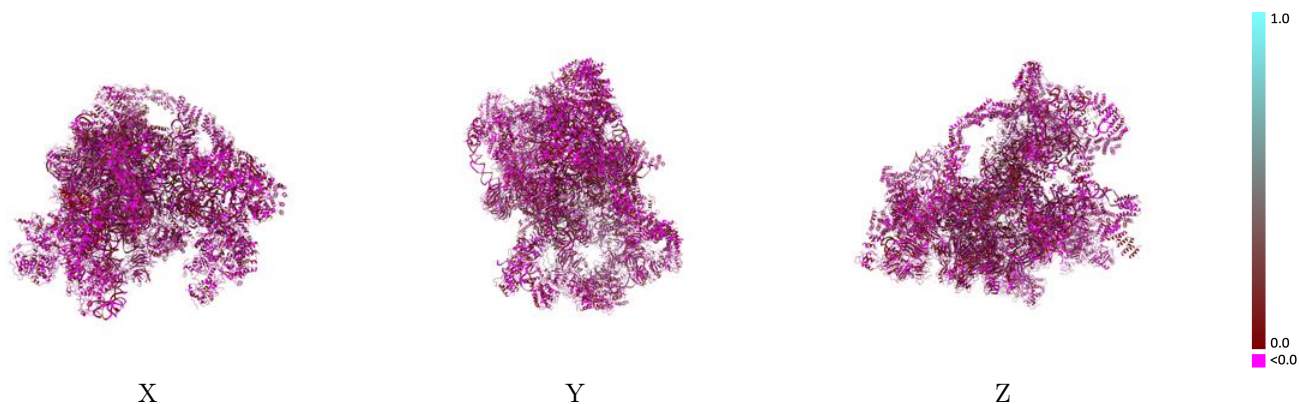
This section contains information regarding the fit between EMDB map EMD-30588 and PDB model 7D63. Per-residue inclusion information can be found in section 3 on page 18.

9.1 Map-model overlay [i](#)



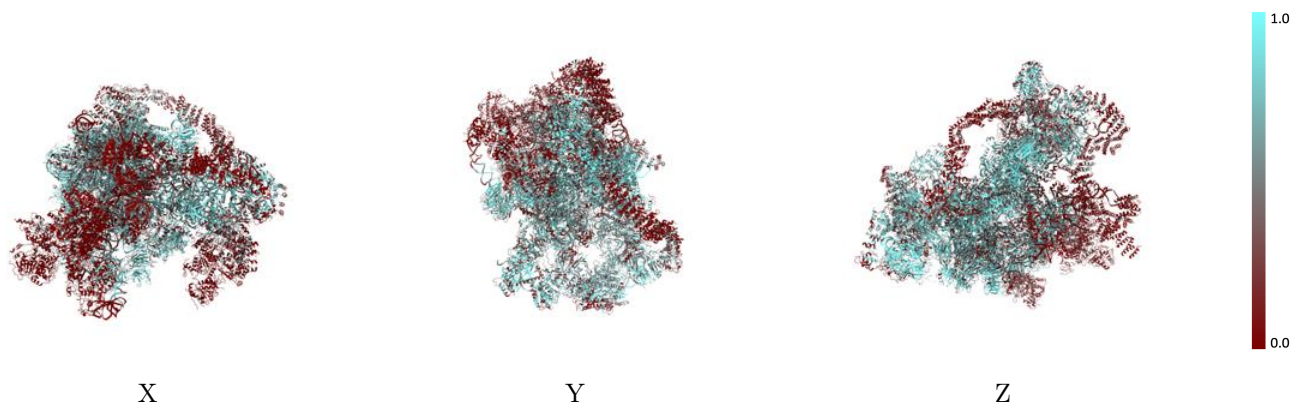
The images above show the 3D surface view of the map at the recommended contour level 0.01 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



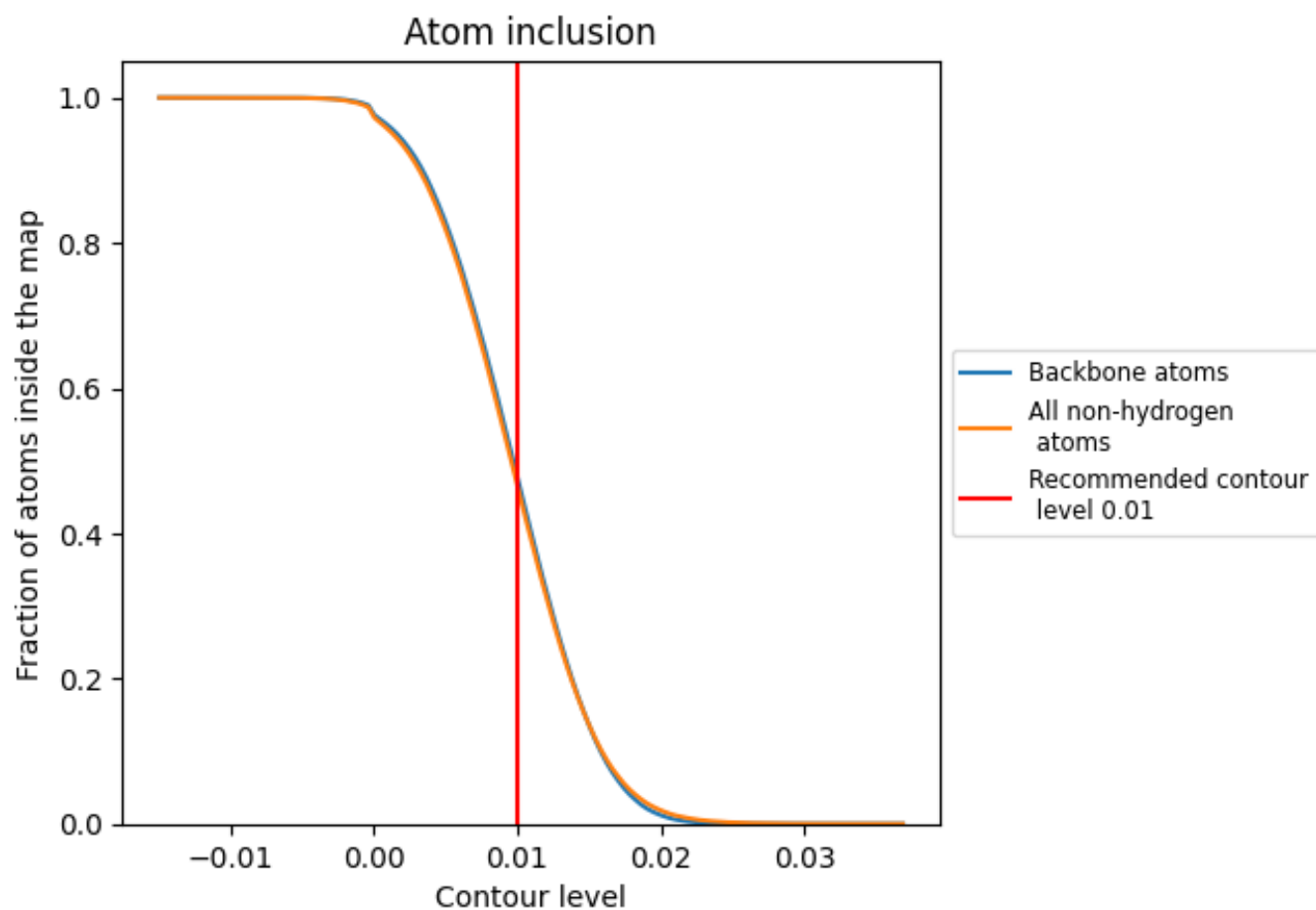
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.01).







































































9.4 Atom inclusion [i](#)



At the recommended contour level, 48% of all backbone atoms, 47% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary











































































The table lists the average atom inclusion at the recommended contour level (0.01) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.4663	 0.0430
3A	 0.7300	 0.0750
3B	 0.4846	 0.0720
3C	 0.5047	 0.0300
3D	 0.6483	 0.0740
3E	 0.5398	 0.0530
3F	 0.6800	 0.0520
3G	 0.7002	 0.0700
3H	 0.5476	 0.0570
5A	 0.4617	 0.0410
5B	 0.1729	 0.0220
5C	 0.5190	 0.0420
5D	 0.3622	 0.0510
5E	 0.4859	 0.0690
5F	 0.4842	 0.0750
5G	 0.4939	 0.0710
5H	 0.5398	 0.0360
5I	 0.6095	 0.0490
5J	 0.3962	 0.0810
5K	 0.3806	 0.0530
A4	 0.6796	 0.0470
A5	 0.6300	 0.0460
A8	 0.5599	 0.0260
A9	 0.6911	 0.0700
AE	 0.3060	 0.0360
AF	 0.6458	 0.0650
AG	 0.7177	 0.0530
B1	 0.6051	 0.0590
B2	 0.7074	 0.0560
B3	 0.5319	 0.0300
B6	 0.4546	 0.0650
B8	 0.5905	 0.0510
BE	 0.6955	 0.0560
RA	 0.3732	 0.0180
RB	 0.3330	 0.0360



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Chain	Atom inclusion	Q-score
RD	 0.0004	 -0.0180
RE	 0.0598	 0.0080
RF	 0.0433	 0.0160
RG	 0.6276	 0.0530
RH	 0.4675	 0.0300
RJ	 0.5959	 0.0590
RK	 0.6341	 0.0620
RL	 0.2219	 0.0320
RM	 0.0712	 0.0130
RN	 0.4697	 0.0370
RO	 0.4465	 0.0330
RP	 0.2622	 0.0280
RQ	 0.2178	 0.0110
RS	 0.6409	 0.0240
RT	 0.0868	 -0.0040
RY	 0.1741	 -0.0020
RZ	 0.0696	 0.0220
SA	 0.5941	 0.0540
SC	 0.1118	 0.0220
SF	 0.5138	 0.0200
SG	 0.6419	 0.0910
SH	 0.4744	 0.0360
SI	 0.1106	 0.0190
SJ	 0.5737	 0.0260
SK	 0.5503	 0.0880
SM	 0.5310	 -0.0050
SO	 0.1892	 0.0210
SP	 0.1962	 0.0140
SR	 0.5556	 0.0800
ST	 0.1510	 0.0370
SU	 0.1314	 0.0350
SX	 0.1589	 0.0140
SY	 0.5432	 0.0730
SZ	 0.5909	 0.0530
Sc	 0.1361	 0.0130
Sd	 0.6436	 0.0760
X1	 0.2727	 0.0560