wwPDB EM Validation Summary Report ⓘ

Nov 19, 2022 – 02:19 pm GMT

PDB ID	:	5MQ0
EMDB ID	:	EMD-3541
Title	:	Structure of a spliceosome remodeled for exon ligation
Authors	:	Fica, S.M.; Oubridge, C.; Galej, W.P.; Wilkinson, M.E.; Newman, A.J.; Bai, X.-C.; Nagai, K.
Deposited on	:	2016-12-19
Resolution	:	4.17 Å(reported)

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

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/EMValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

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

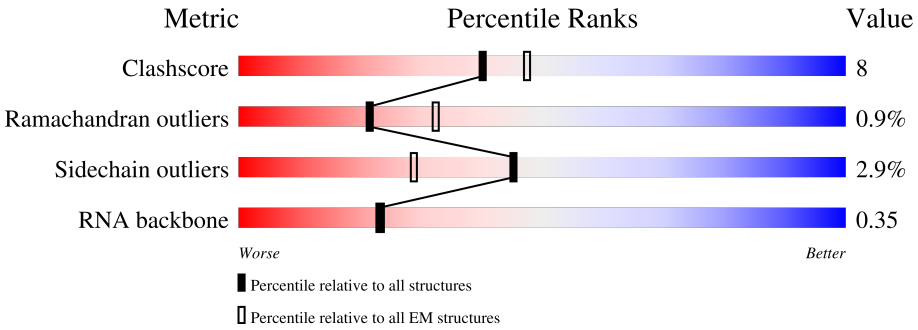
EMDB validation analysis	:	0.0.1.dev43
Mogul	:	1.8.4, CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.9
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.31.2

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 4.17 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
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 <=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	I	95	11% 13% 19% · 64%
2	E	20	20% 15% 50% 15% 20%
3	2	1175	10% 8% · · 87%
4	6	112	· 36% 43% 10% 12%
5	5	179	13% 32% 37% 9% 21%
6	A	2413	14% 64% 15% 21%
7	C	1008	18% 71% 16% 13%

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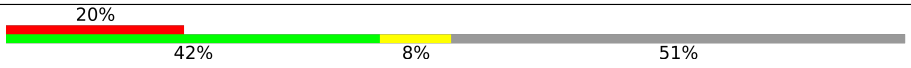
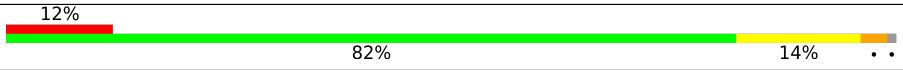
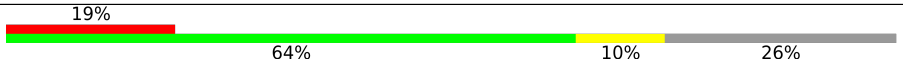
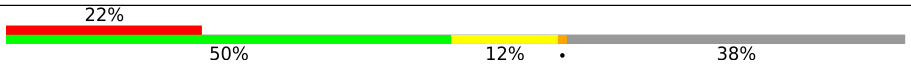
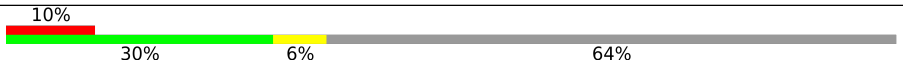
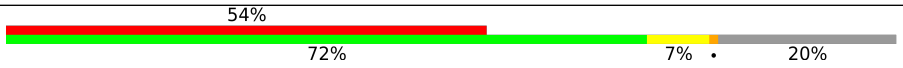
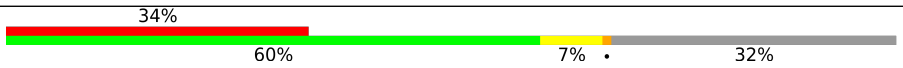
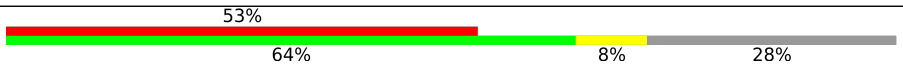
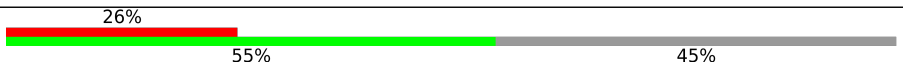
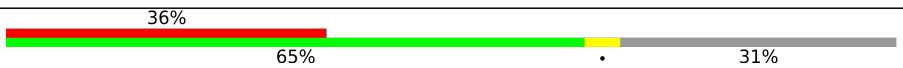
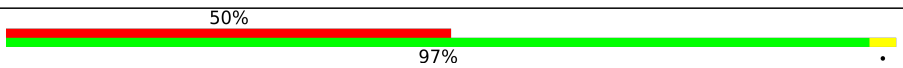
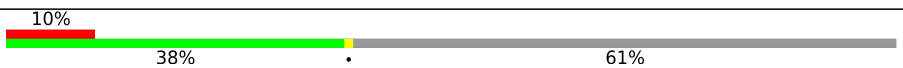
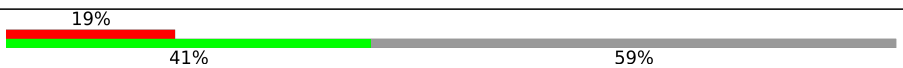
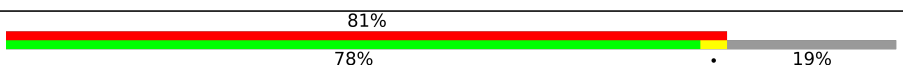
Mol	Chain	Length	Quality of chain
8	H	577	
9	J	451	
10	K	379	
11	L	157	
12	M	339	
13	N	364	
14	O	590	
15	P	175	
16	R	135	
17	S	687	
18	T	877	
19	a	251	
20	c	382	
21	o	455	
22	X	68	
23	y	215	
24	b	196	
24	k	196	
25	d	101	
25	n	101	
26	e	94	
26	p	94	
27	f	86	
27	q	86	
28	g	77	

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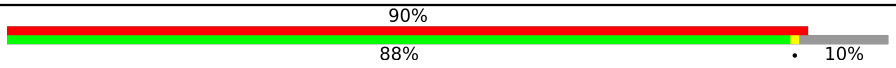
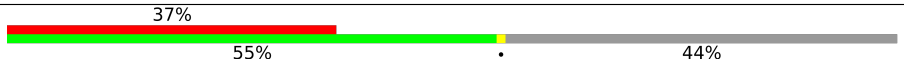
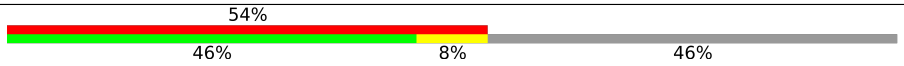
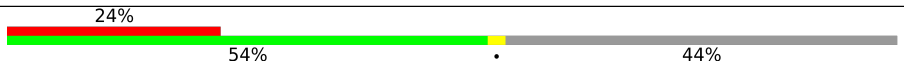
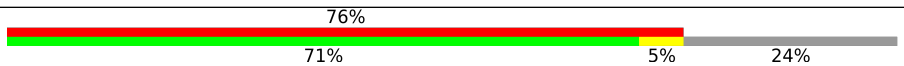
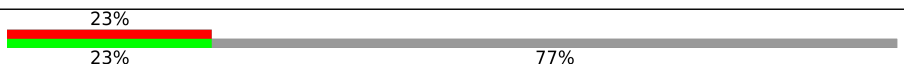
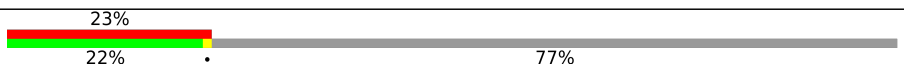
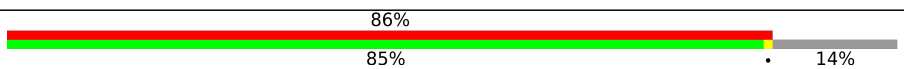
Mol	Chain	Length	Quality of chain
28	r	77	
29	h	146	
29	l	146	
30	j	110	
30	m	110	
31	V	1145	
32	W	238	
33	Y	111	
34	3	3	
35	s	175	
36	t	503	
36	u	503	
36	v	503	
36	w	503	

2 Entry composition (i)

There are 41 unique types of molecules in this entry. The entry contains 77441 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 Yeast UBC4 gene for ubiquitin-conjugating enzyme.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
1	I	34	714	321	118	241	34	0	0

- Molecule 2 is a RNA chain called 5'-EXON OF UBC4 PRE-MRNA.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
2	E	16	346	155	66	109	16	0	0

- Molecule 3 is a RNA chain called S.cerevisiae chromosome II reading frame ORF YBR230c.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
3	2	155	3271	1462	547	1107	155	0	0

- Molecule 4 is a RNA chain called Saccharomyces cerevisiae strain T.52_2H chromosome XII sequence.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
4	6	99	2108	944	375	690	99	0	0

- Molecule 5 is a RNA chain called Saccharomyces cerevisiae strain WI_C_MBSP_4 chromosome VII sequence.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	P		
5	5	141	2999	1342	530	986	141	0	0

- Molecule 6 is a protein called Pre-mRNA-splicing factor 8.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	A	1914	Total	C	N	O	S	0	0
			15199	9832	2669	2645	53		

- Molecule 7 is a protein called Pre-mRNA-splicing factor SNU114.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	C	874	Total	C	N	O	S	0	0
			6562	4265	1104	1168	25		

- Molecule 8 is a protein called Pre-mRNA-splicing factor CWC22.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	H	401	Total	C	N	O	S	0	0
			3261	2104	544	595	18		

- Molecule 9 is a protein called Pre-mRNA-splicing factor PRP46.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	J	342	Total	C	N	O	S	0	0
			2690	1699	475	506	10		

- Molecule 10 is a protein called Pre-mRNA-processing protein 45.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	K	187	Total	C	N	O	S	0	0
			1458	908	269	276	5		

- Molecule 11 is a protein called Pre-mRNA-splicing factor BUD31.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	L	155	Total	C	N	O	S	0	0
			1162	737	217	198	10		

- Molecule 12 is a protein called Pre-mRNA-splicing factor CWC2.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	M	252	Total	C	N	O	S	0	0
			2016	1281	356	368	11		

- Molecule 13 is a protein called Pre-mRNA-splicing factor SLT11.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	N	227	Total	C	N	O	S	0	0
			1798	1139	309	335	15		

- Molecule 14 is a protein called Pre-mRNA-splicing factor CEF1.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	O	211	Total	C	N	O	S	0	0
			1755	1102	320	327	6		

- Molecule 15 is a protein called Pre-mRNA-splicing factor CWC15.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	P	69	Total	C	N	O	S	0	0
			565	358	112	94	1		

- Molecule 16 is a protein called Pre-mRNA-splicing factor CWC21.

Mol	Chain	Residues	Atoms				AltConf	Trace
16	R	108	Total	C	N	O	0	0
			614	369	121	124		

- Molecule 17 is a protein called Pre-mRNA-splicing factor CLF1.

Mol	Chain	Residues	Atoms					AltConf	Trace
17	S	468	Total	C	N	O	S	0	0
			3229	2025	599	598	7		

- Molecule 18 is a protein called Pre-mRNA-splicing factor SYF1,PRE-MRNA-SPLICING FACTOR SYF1.

Mol	Chain	Residues	Atoms				AltConf	Trace
18	T	633	Total	C	N	O	0	0
			3154	1888	633	633		

- Molecule 19 is a protein called Pre-mRNA-splicing factor 18.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	a	137	Total	C	N	O	S	0	0
			1119	726	194	196	3		

- Molecule 20 is a protein called Pre-mRNA-splicing factor SLU7.

Mol	Chain	Residues	Atoms					AltConf	Trace
20	c	103	Total	C	N	O	S	0	0
			786	498	142	144	2		

- Molecule 21 is a protein called Pre-mRNA-processing factor 17.

Mol	Chain	Residues	Atoms					AltConf	Trace
21	o	313	Total	C	N	O	S	0	0
			2425	1537	429	451	8		

- Molecule 22 is a protein called UNKNOWN PROTEIN.

Mol	Chain	Residues	Atoms				AltConf	Trace
22	X	68	Total	C	N	O	0	0
			338	202	68	68		

- Molecule 23 is a protein called Pre-mRNA-splicing factor SYF2.

Mol	Chain	Residues	Atoms					AltConf	Trace
23	y	83	Total	C	N	O	S	0	0
			679	420	125	133	1		

- Molecule 24 is a protein called Small nuclear ribonucleoprotein-associated protein B.

Mol	Chain	Residues	Atoms					AltConf	Trace
24	b	80	Total	C	N	O	S	0	0
			631	403	114	111	3		
24	k	80	Total	C	N	O	S	0	0
			631	403	114	111	3		

- Molecule 25 is a protein called Small nuclear ribonucleoprotein Sm D3.

Mol	Chain	Residues	Atoms					AltConf	Trace
25	d	82	Total	C	N	O	S	0	0
			625	399	109	115	2		
25	n	82	Total	C	N	O	S	0	0
			625	399	109	115	2		

- Molecule 26 is a protein called Small nuclear ribonucleoprotein E.

Mol	Chain	Residues	Atoms					AltConf	Trace
26	e	75	Total	C	N	O	S	0	0
			575	379	92	101	3		

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Mol	Chain	Residues	Atoms					AltConf	Trace
26	p	75	Total	C	N	O	S	0	0
			575	379	92	101	3		

- Molecule 27 is a protein called Small nuclear ribonucleoprotein F.

Mol	Chain	Residues	Atoms					AltConf	Trace
27	f	72	Total	C	N	O	S	0	0
			573	368	101	103	1		
27	q	72	Total	C	N	O	S	0	0
			573	368	101	103	1		

- Molecule 28 is a protein called Small nuclear ribonucleoprotein G.

Mol	Chain	Residues	Atoms					AltConf	Trace
28	g	69	Total	C	N	O	S	0	0
			529	337	93	97	2		
28	r	69	Total	C	N	O	S	0	0
			526	336	93	95	2		

- Molecule 29 is a protein called Small nuclear ribonucleoprotein Sm D1.

Mol	Chain	Residues	Atoms					AltConf	Trace
29	h	82	Total	C	N	O	S	0	0
			644	409	110	123	2		
29	l	79	Total	C	N	O	S	0	0
			618	393	107	116	2		

- Molecule 30 is a protein called Small nuclear ribonucleoprotein Sm D2.

Mol	Chain	Residues	Atoms					AltConf	Trace
30	j	94	Total	C	N	O	S	0	0
			741	477	141	119	4		
30	m	93	Total	C	N	O	S	0	0
			726	468	136	118	4		

- Molecule 31 is a protein called Pre-mRNA-splicing factor ATP-dependent RNA helicase PRP22.

Mol	Chain	Residues	Atoms				AltConf	Trace
31	V	645	Total	C	N	O	0	0
			3189	1899	645	645		

- Molecule 32 is a protein called U2 small nuclear ribonucleoprotein A'.

Mol	Chain	Residues	Atoms				AltConf	Trace
32	W	164	Total	C	N	O	0	0
			816	488	164	164		

- Molecule 33 is a protein called U2 small nuclear ribonucleoprotein B".

Mol	Chain	Residues	Atoms				AltConf	Trace
33	Y	84	Total	C	N	O	0	0
			416	248	84	84		

- Molecule 34 is a RNA chain called 3'-EXON OF UBC4 PRE-MRNA, BOUND BY PRP22 HELICASE.

Mol	Chain	Residues	Atoms					AltConf	Trace
34	3	3	Total	C	N	O	P	0	0
			60	27	6	24	3		

- Molecule 35 is a protein called Pre-mRNA-splicing factor SNT309.

Mol	Chain	Residues	Atoms				AltConf	Trace
35	s	110	Total	C	N	O	0	0
			548	328	110	110		

- Molecule 36 is a protein called Pre-mRNA-processing factor 19.

Mol	Chain	Residues	Atoms				AltConf	Trace
36	t	438	Total	C	N	O	0	0
			2171	1295	438	438		
36	u	116	Total	C	N	O	0	0
			578	346	116	116		
36	v	118	Total	C	N	O	0	0
			588	352	118	118		
36	w	435	Total	C	N	O	0	0
			2156	1286	435	435		

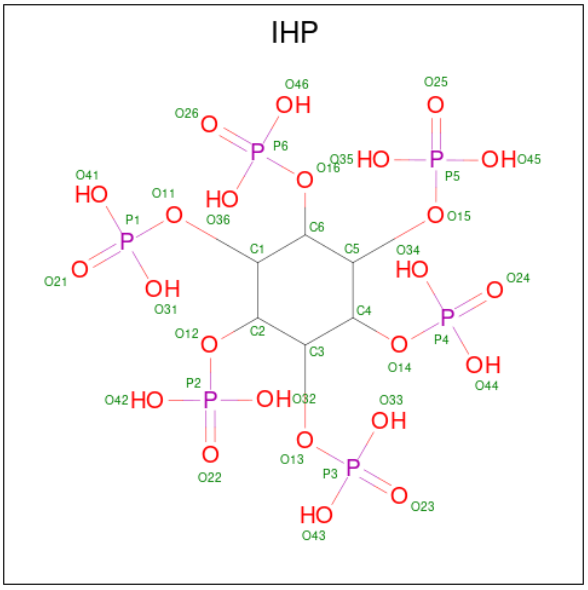
- Molecule 37 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		AltConf
37	6	3	Total	Mg	0
			3	3	

- Molecule 38 is POTASSIUM ION (three-letter code: K) (formula: K).

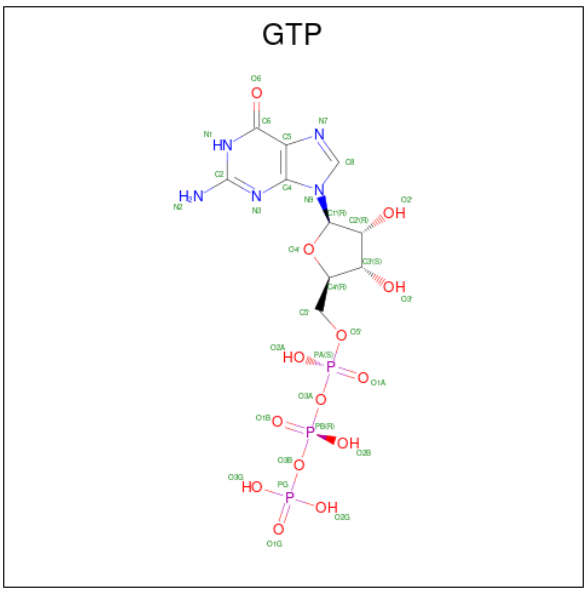
Mol	Chain	Residues	Atoms	AltConf
38	6	2	Total K 2 2	0

- Molecule 39 is INOSITOL HEXAKISPHOSPHATE (three-letter code: IHP) (formula: $C_6H_{18}O_{24}P_6$).



Mol	Chain	Residues	Atoms	AltConf
39	A	1	Total C O P 36 6 24 6	0

- Molecule 40 is GUANOSINE-5'-TRIPHOSPHATE (three-letter code: GTP) (formula: $C_{10}H_{16}N_5O_{14}P_3$).



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

- Molecule 41 is ZINC ION (three-letter code: ZN) (formula: Zn).

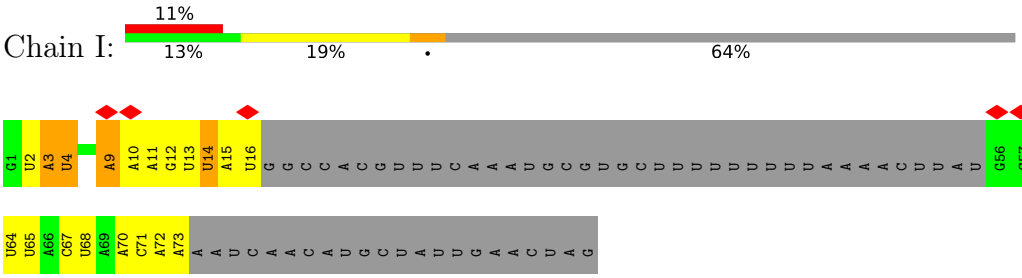
Mol	Chain	Residues	Atoms		AltConf
41	L	3	Total	Zn	0
			3	3	
41	M	1	Total	Zn	0
			1	1	
41	N	2	Total	Zn	0
			2	2	

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.

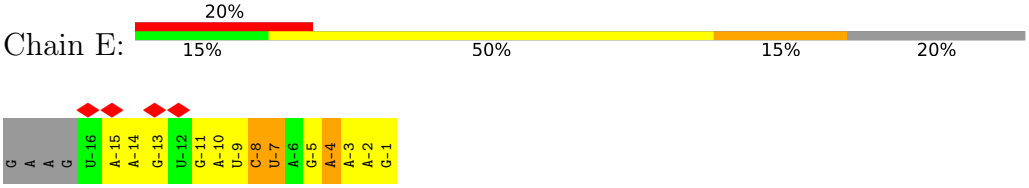
• Molecule 1: Yeast UBC4 gene for ubiquitin-conjugating enzyme

Chain I:



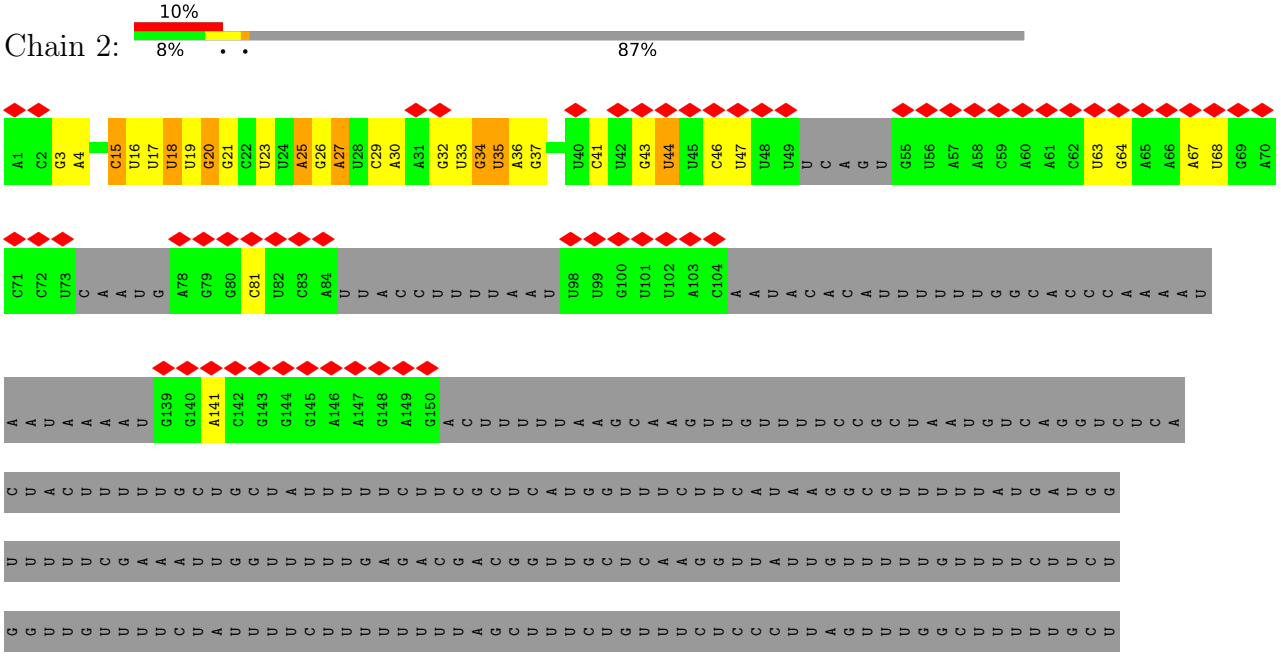
• Molecule 2: 5'-EXON OF UBC4 PRE-MRNA

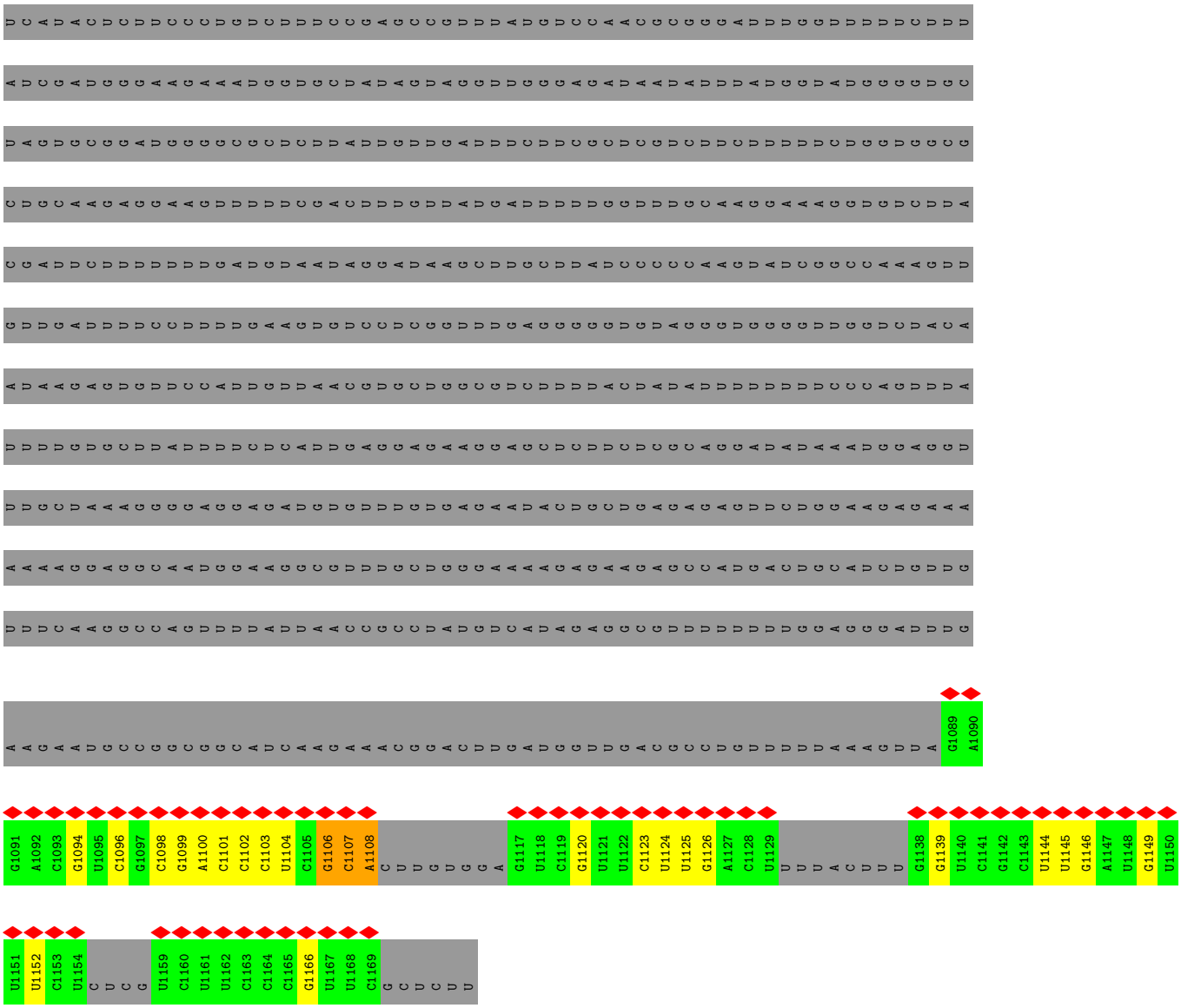
Chain E:



• Molecule 3: S.cerevisiae chromosome II reading frame ORF YBR230c

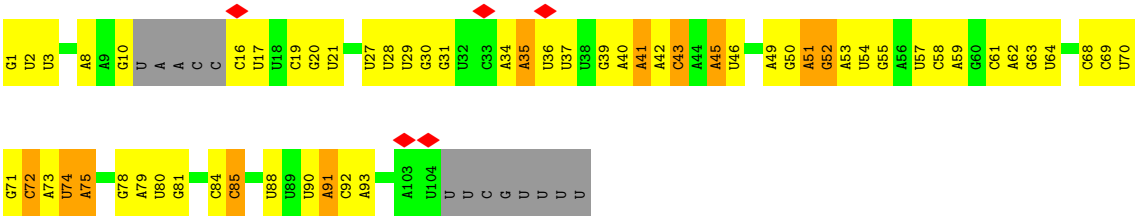
Chain 2:





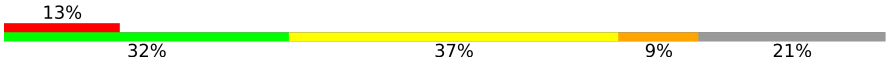
• Molecule 4: Saccharomyces cerevisiae strain T.52_2H chromosome XII sequence

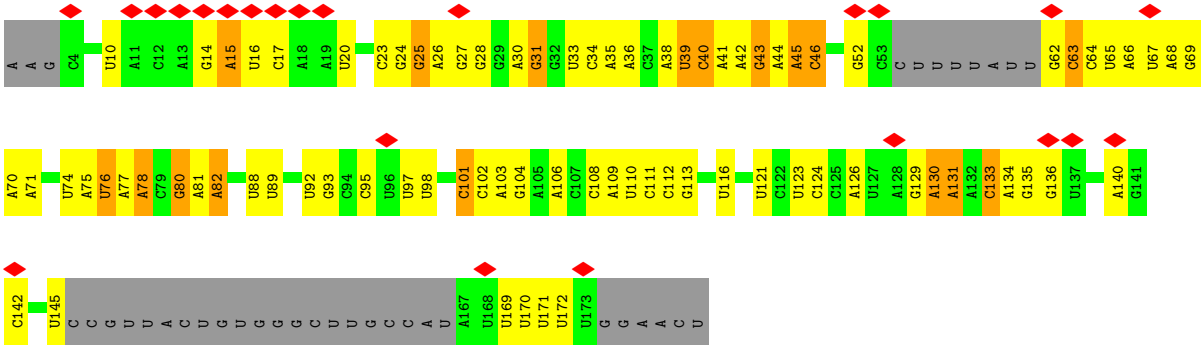
Chain 6:



• Molecule 5: Saccharomyces cerevisiae strain WI_C_MBSP_4 chromosome VII sequence

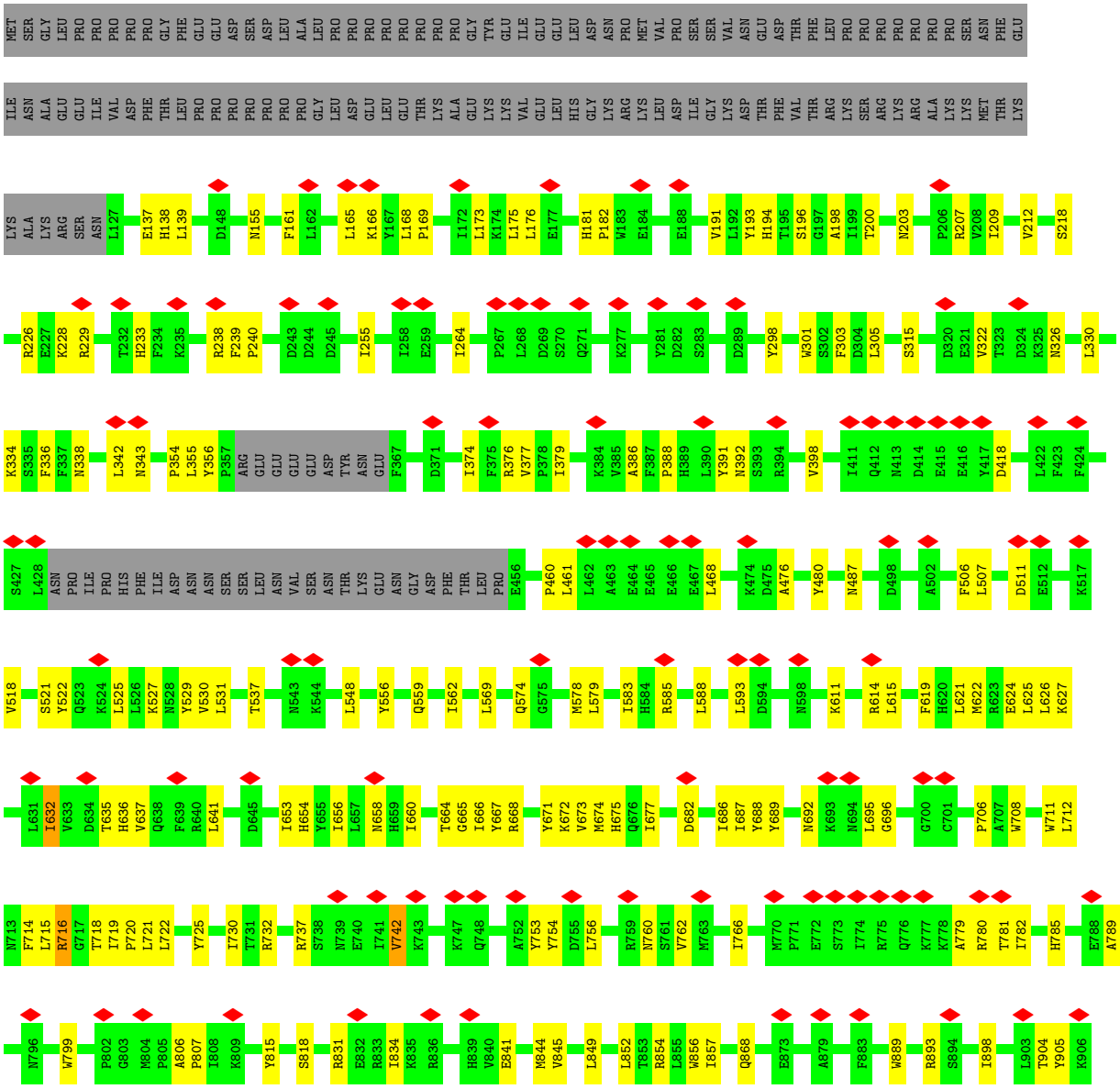
Chain 5:

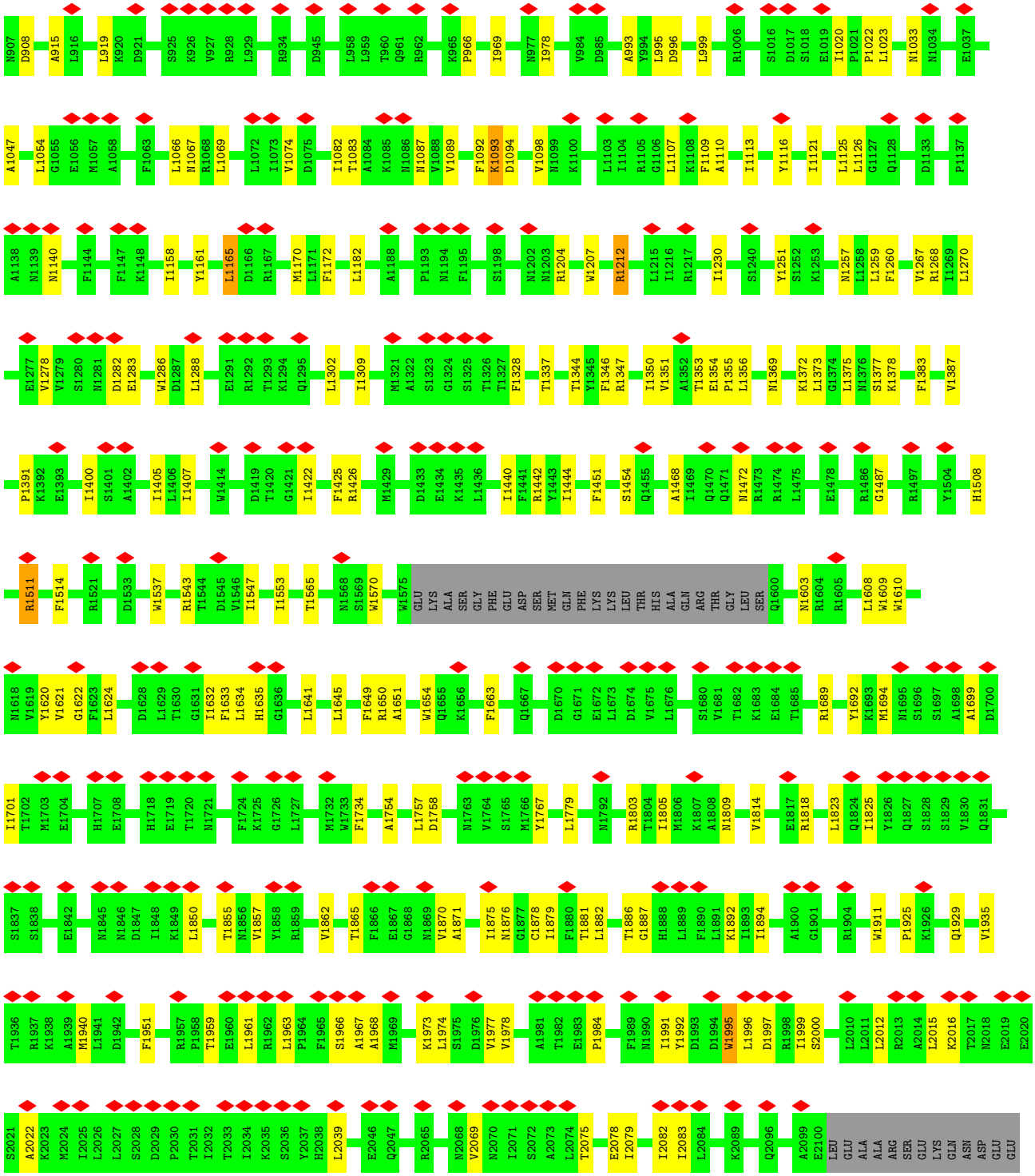




• Molecule 6: Pre-mRNA-splicing factor 8

Chain A:

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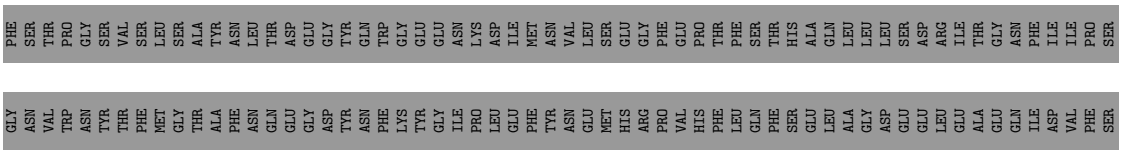
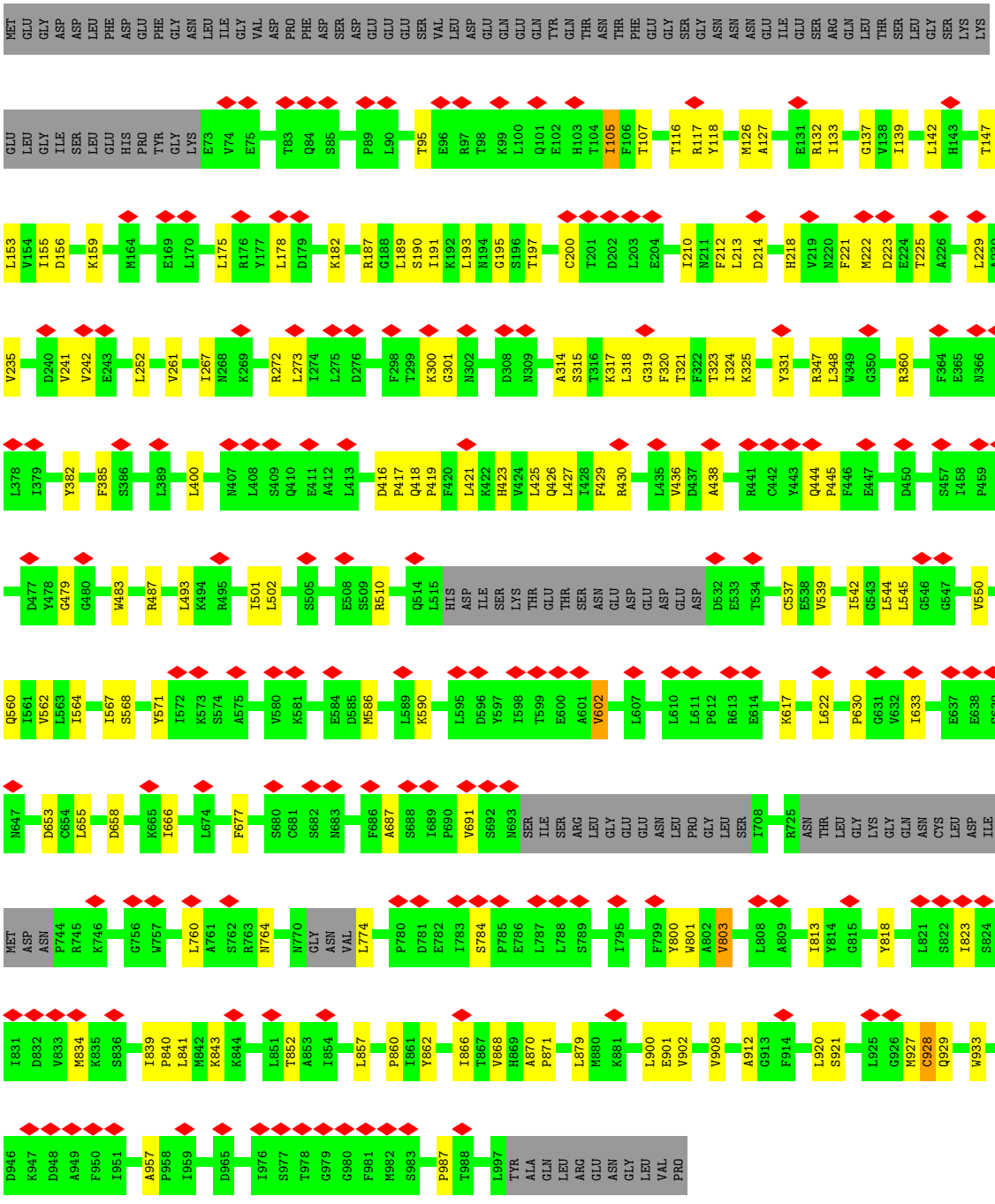
A1047 L1054 G1055 E1056 M1057 A1058 F1063 L1066 N1067 R1068 L1069 L1072 I1073 V1074 D1075 I1082 T1083 A1084 K1085 N1086 N1087 V1088 V1089 F1092 K1093 D1094 V1098 N1099 K1100 L1103 I1104 R1105 G1106 L1107 K1108 F1109 A1110 I1113 Y1116 I1121 L1125 L1126 G1127 Q1128 D1133 P1137
A1138 N1139 N1140 F1144 F1147 K1148 I1158 Y1161 L1165 D1166 R1167 M1170 L1171 F1172 L1182 A1188 P1193 N1194 F1195 S1198 N1202 N1203 R1204 W1207 R1212 L1215 I1216 R1217 I1230 S1240 Y1251 S1252 K1253 N1257 L1258 L1259 F1260 V1267 R1268 I1269 L1270
E1277 V1278 V1279 S1280 N1281 D1282 E1283 W1286 D1287 L1288 E1291 R1292 T1293 K1294 Q1295 L1302 I1309 M1321 A1322 S1323 G1324 S1325 T1326 T1327 F1328 T1337 T1344 Y1345 F1346 R1347 I1350 V1351 A1352 T1353 E1354 P1355 L1356 N1369 K1372 L1373 G1374 L1375 N1376 S1377 K1378 F1383 V1387
P1391 K1392 E1393 I1400 S1401 A1402 I1405 L1406 I1407 W1414 D1419 T1420 G1421 I1422 F1425 R1426 M1429 D1433 E1434 K1435 L1436 I1440 F1441 R1442 Y1443 I1444 F1451 S1454 Q1455 A1468 I1469 Q1470 Q1471 N1472 R1473 R1474 L1475 E1478 R1486 G1487 R1497 Y1504 H1508
R1511 F1514 R1521 D1533 W1537 R1543 T1544 D1545 V1546 I1547 I1553 T1565 N1568 S1569 W1570 W1575 GLU LYS ALA SER GLY PHE GLU ASP SER MET GLN PHE LYS LYS LEU THR HIS ALA GLN ARG THR GLY LEU SER Q1600 N1603 R1604 R1605 L1608 W1609 W1610
N1618 V1619 Y1620 V1621 G1622 F1623 L1624 D1628 L1629 T1630 G1631 I1632 F1633 L1634 H1635 G1636 L1641 L1645 F1649 R1650 A1651 W1654 Q1655 K1656 F1663 Q1667 D1670 G1671 E1672 L1673 D1674 V1675 L1676 S1680 V1681 T1682 K1683 E1684 T1685 R1689 Y1692 K1693 M1694 N1695 S1696 S1697 A1698 A1699 D1700
I1701 T1702 M1703 E1704 H1707 E1708 H1718 E1719 T1720 N1721 F1724 K1725 G1726 L1727 M1732 W1733 F1734 A1754 L1757 D1758 N1763 V1764 S1765 M1766 Y1767 L1779 N1792 R1803 T1804 I1805 M1806 K1807 A1808 N1809 V1814 E1817 R1818 L1823 Q1824 I1825 Y1826 Q1827 S1828 S1829 V1830 Q1831
S1837 S1838 E1842 N1845 N1846 D1847 I1848 K1849 L1850 T1855 N1856 V1857 Y1858 R1859 V1862 T1865 F1866 E1867 G1868 N1869 V1870 A1871 I1875 N1876 G1877 C1878 I1879 F1880 T1881 L1882 T1886 G1887 H1888 L1889 F1890 L1891 K1892 I1893 I1894 A1900 G1901 R1904 W1911 P1925 K1926 Q1929 V1935
T1936 R1937 K1938 A1939 M1940 L1941 D1942 F1951 R1957 P1958 T1959 E1960 L1961 R1962 L1963 P1964 F1965 S1966 A1967 A1968 M1969 K1973 L1974 S1975 D1976 V1977 V1978 A1981 T1982 E1983 P1984 F1989 N1990 I1991 Y1992 D1993 D1994 W1995 L1996 D1997 R1998 I1999 S2000 L2010 L2011 L2012 R2013 A2014 L2015 K2016 T2017 N2018 E2019 E2020
S2021 A2022 K2023 M2024 I2025 L2026 L2027 S2028 D2029 P2030 T2031 I2032 T2033 I2034 K2035 S2036 Y2037 H2038 L2039 E2046 Q2047 R2065 N2068 V2069 N2070 I2071 S2072 A2073 L2074 T2075 E2078 I2079 I2082 I2083 L2084 K2089 Q2096 A2099 E2100 LEU GLU ALA ALA ARG SER GLU LYS GLN ASN ASP GLU GLU
ALA ALA GLY ALA SER THR VAL MET LYS THR LYS THR ILE ASN ALA GLN GLY GLU GLU ILE VAL VAL ALA SER ALA ASP TYR GLU SER GLN THR PHE SER SER LYS ASN GLU TRP ARG LYS SER ALA ILE ALA ASN THR LEU LEU TYR LEU ARG LEU LYS ASN ILE TYR VAL SER ALA
ASP ASP PHE VAL GLU GLU GLN GLN ASN VAL TYR VAL LEU PRO LYS ASN LEU LEU LYS LYS PHE ILE GLU ILE SER ASP VAL LYS ILE GLN VAL ALA ALA PHE ILE TYR GLY MET SER ALA LYS ASP HIS PRO LYS VAL LYS GLU ILE LYS THR VAL VAL LEU VAL PRO GLN LEU GLY HIS VAL
GLY SER VAL GLN ILE SER ASN ILE PRO ASP ILE GLY ASP LEU PRO ASP THR GLU GLY LEU GLU LEU LEU GLY TRP ILE HIS THR GLN THR GLU GLU LEU LYS PHE MET ALA ALA SER GLU VAL ALA THR HIS SER LYS LEU PHE ALA ASP LYS LYS ASP CYS ILE ASP ILE SER ILE



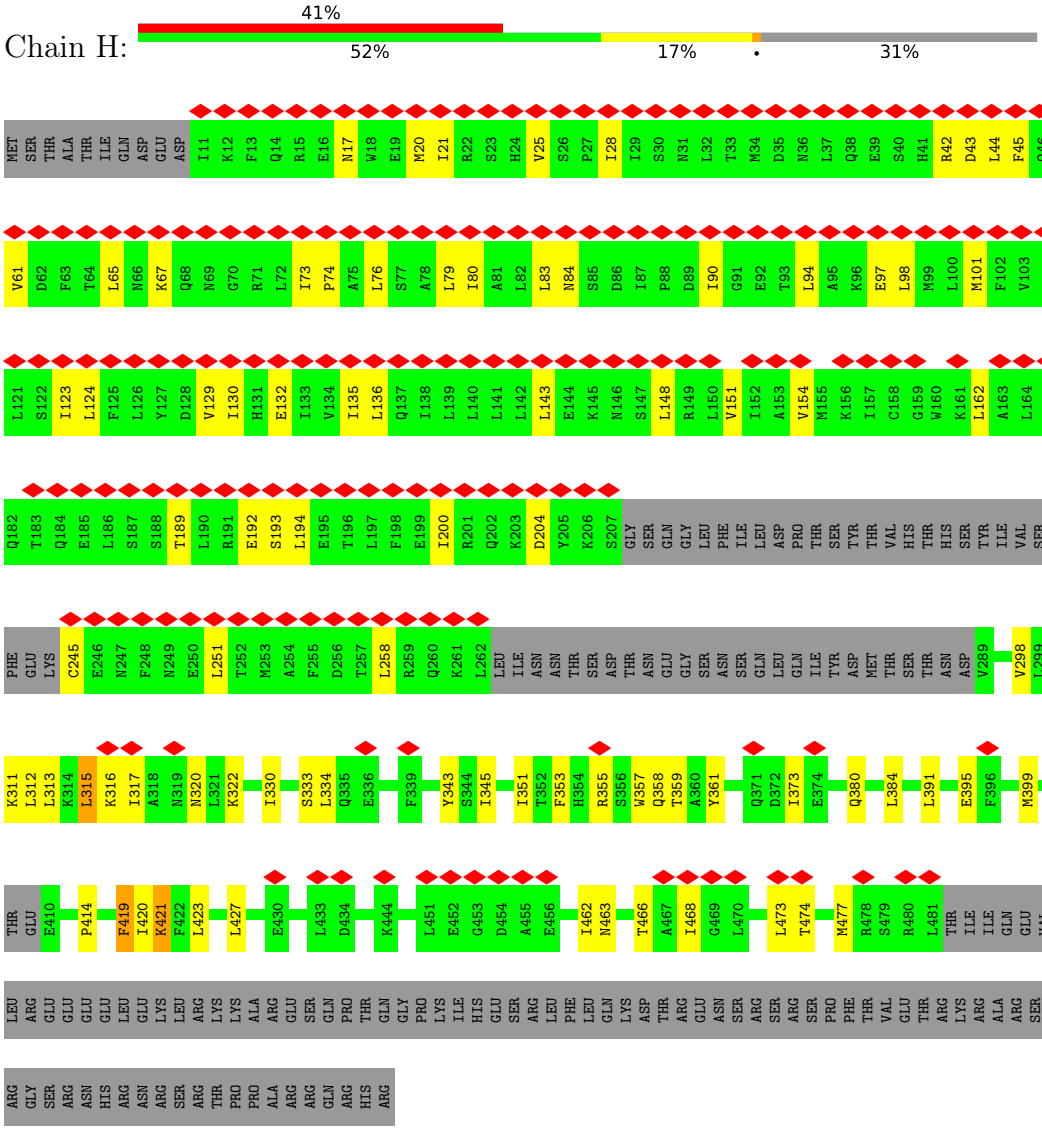
• Molecule 7: Pre-mRNA-splicing factor SNU114

Chain C:



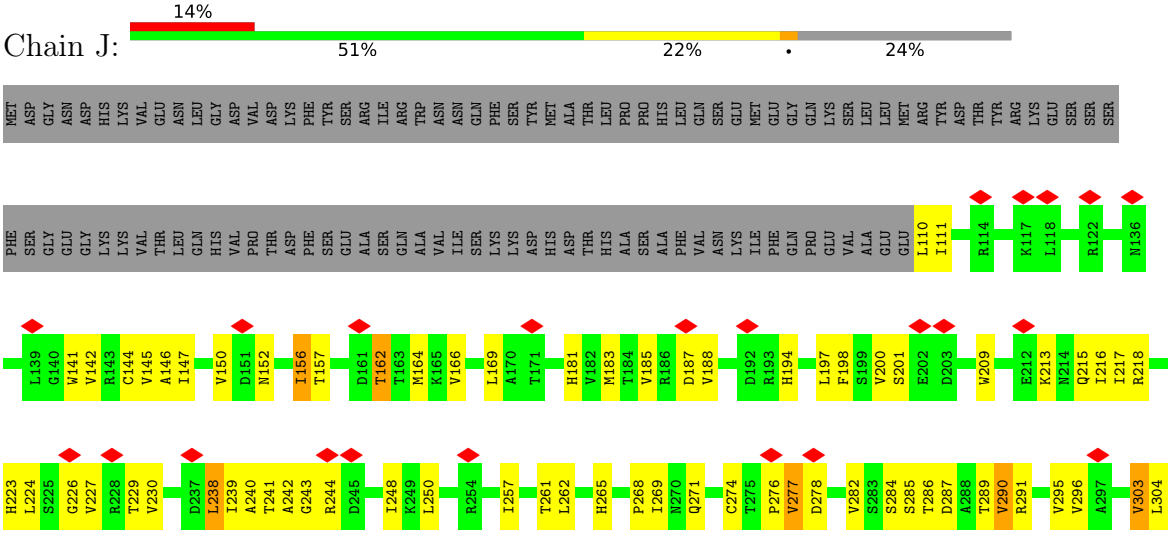
• Molecule 8: Pre-mRNA-splicing factor CWC22

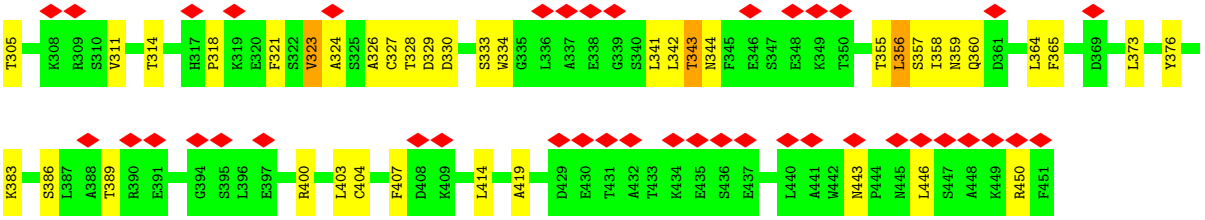
Chain H:



• Molecule 9: Pre-mRNA-splicing factor PRP46

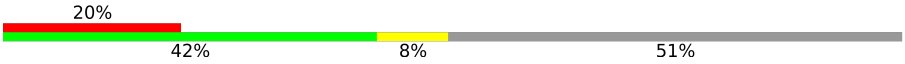
Chain J:

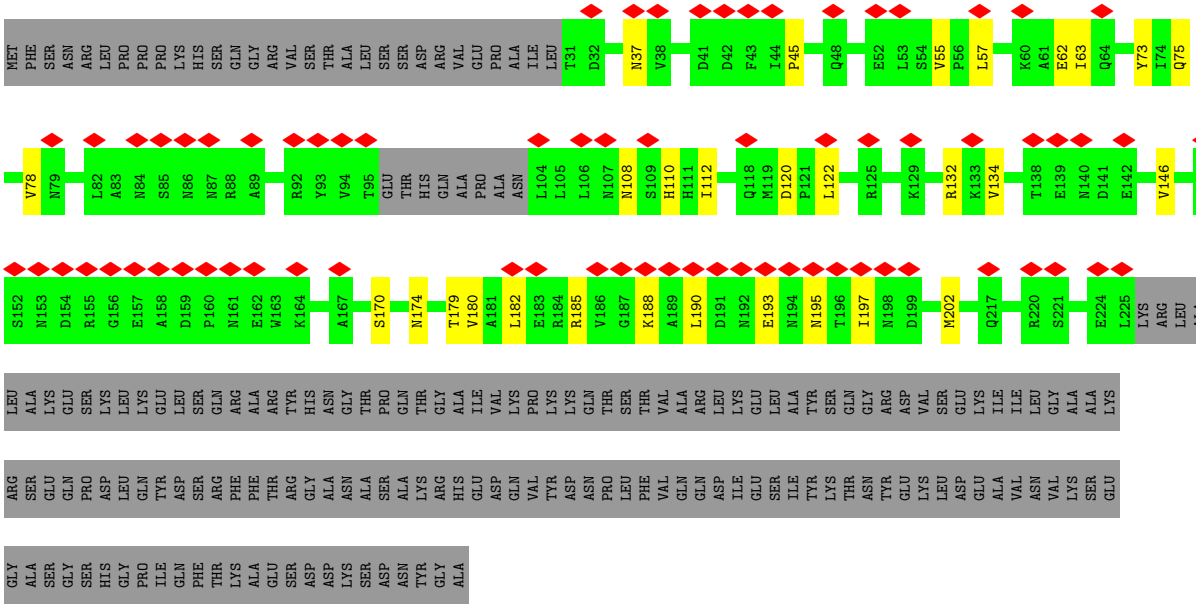




• Molecule 10: Pre-mRNA-processing protein 45

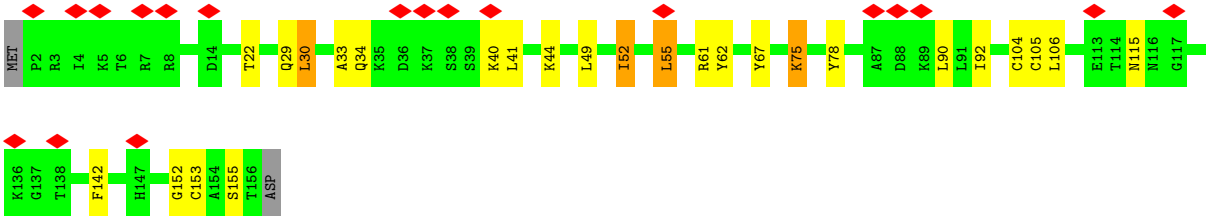
Chain K:





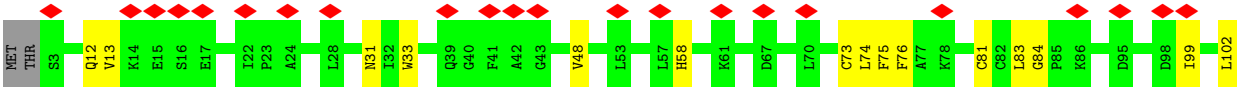
• Molecule 11: Pre-mRNA-splicing factor BUD31

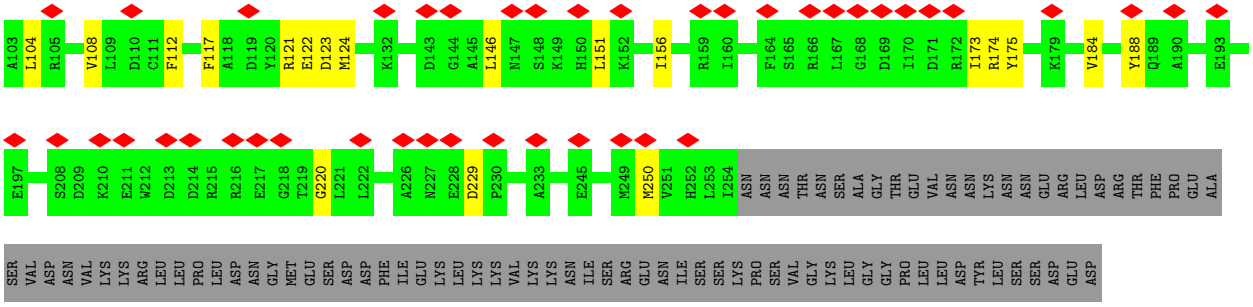
Chain L:



• Molecule 12: Pre-mRNA-splicing factor CWC2

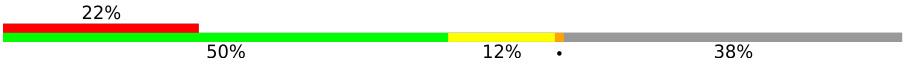
Chain M:

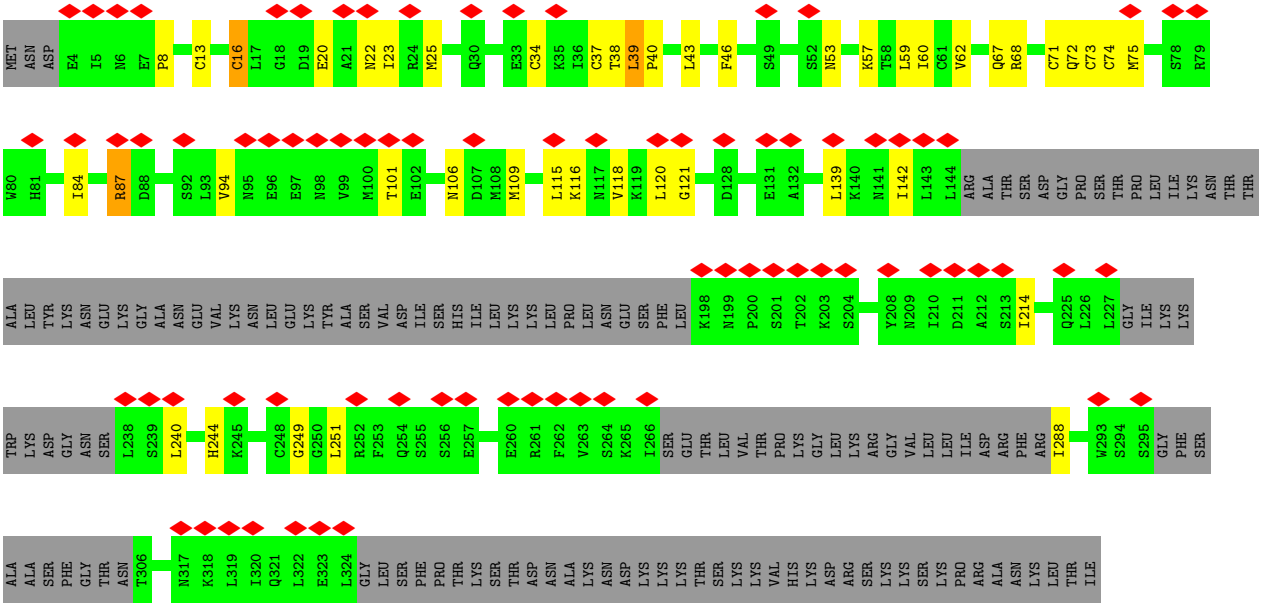




• Molecule 13: Pre-mRNA-splicing factor SLT11

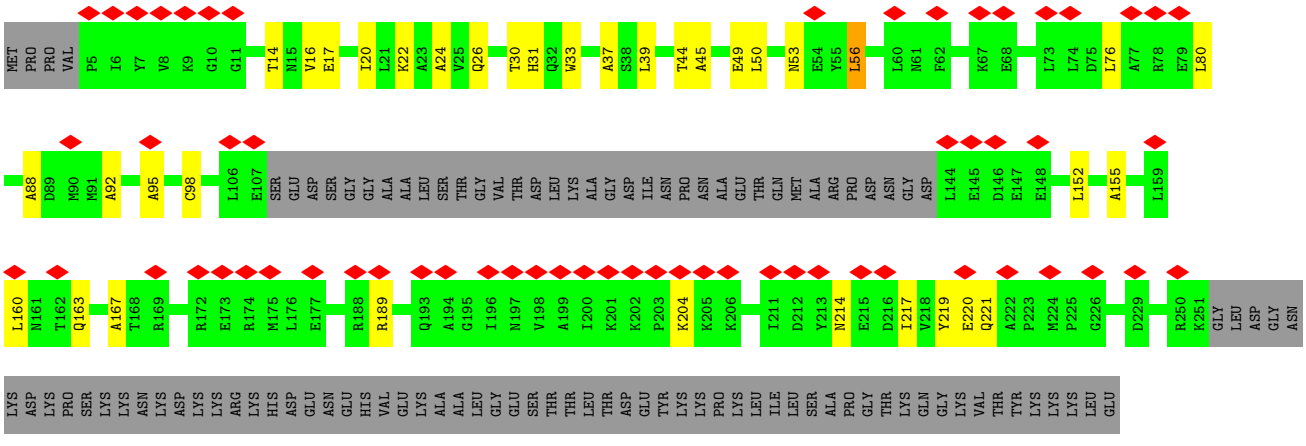
Chain N:

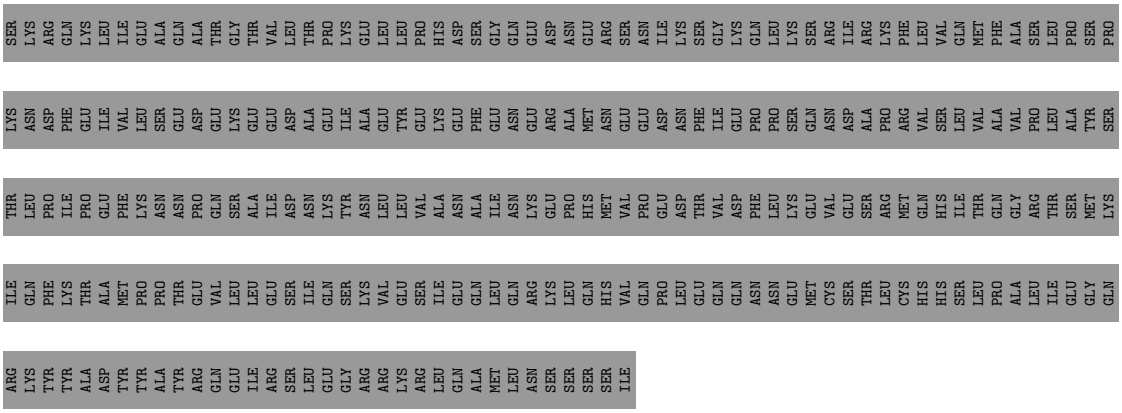




• Molecule 14: Pre-mRNA-splicing factor CEF1

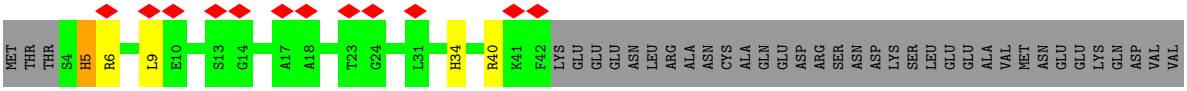
Chain O:

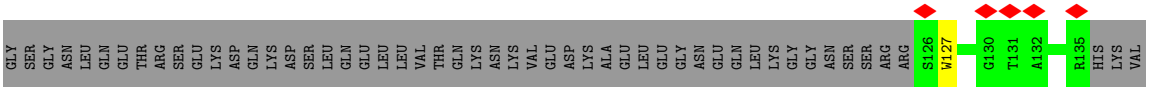


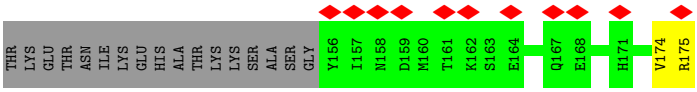


• Molecule 15: Pre-mRNA-splicing factor CWC15

Chain P:

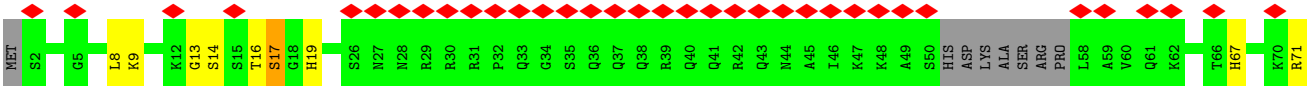


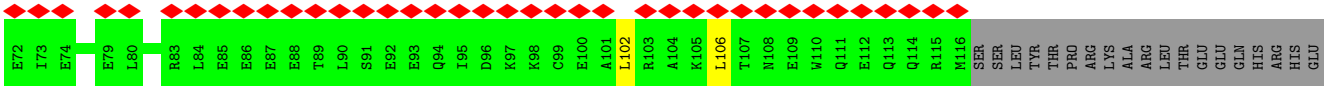




• Molecule 16: Pre-mRNA-splicing factor CWC21

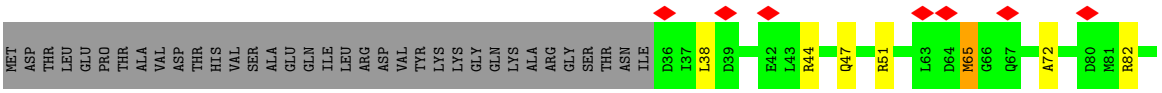
Chain R:

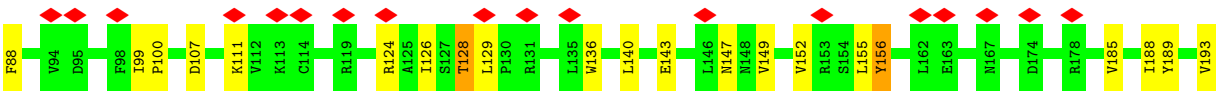


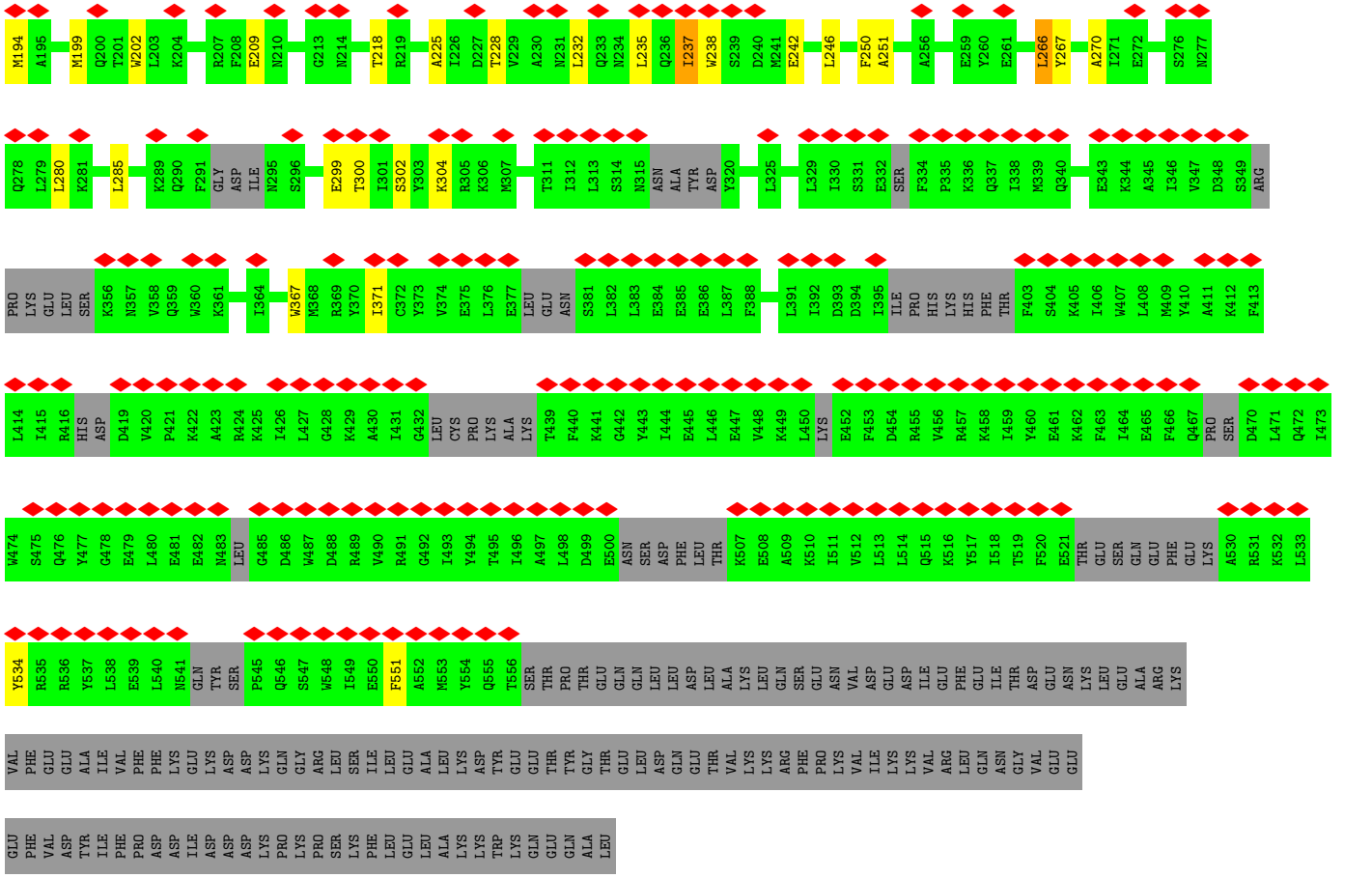


• Molecule 17: Pre-mRNA-splicing factor CLF1

Chain S:

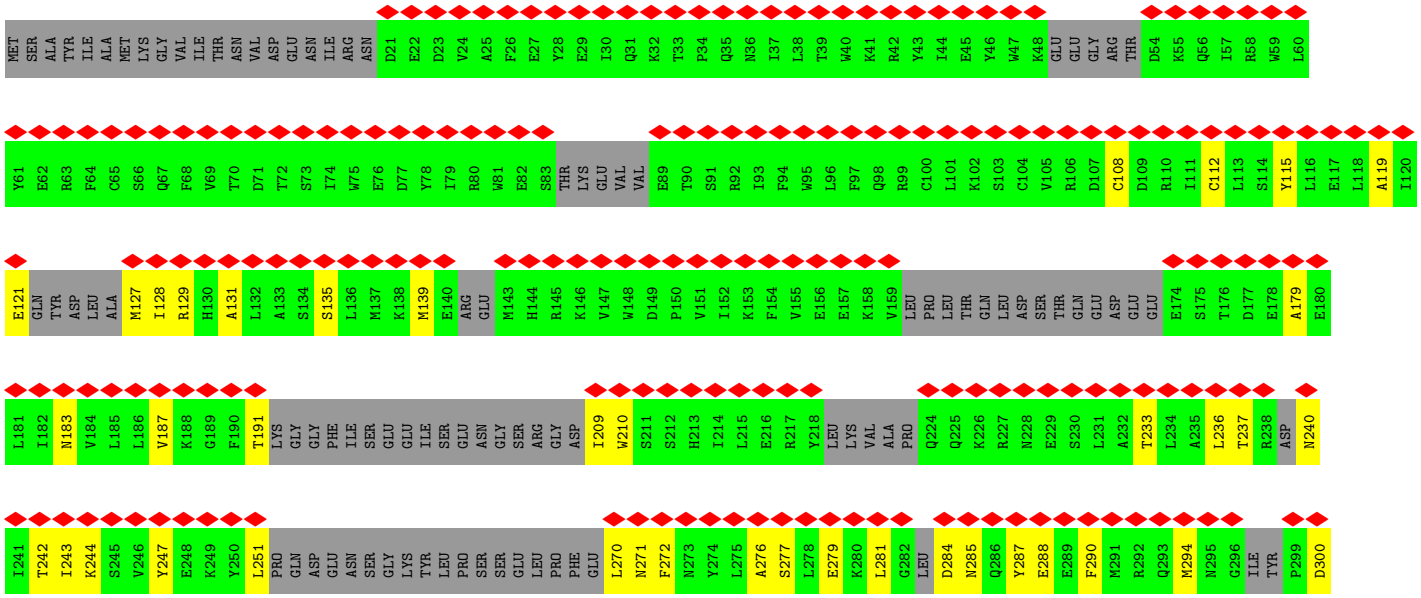


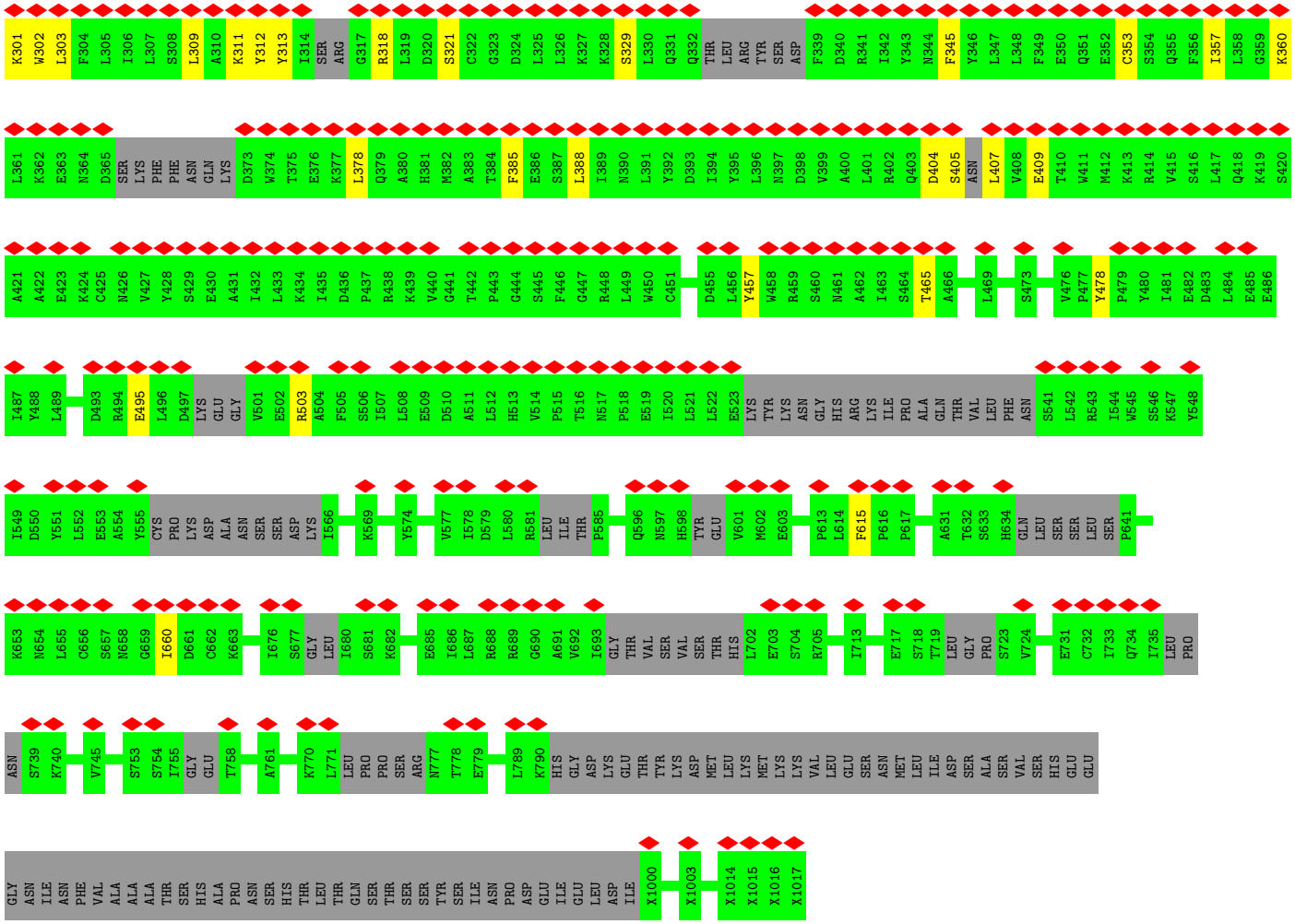




• Molecule 18: Pre-mRNA-splicing factor SYF1,PRE-MRNA-SPLICING FACTOR SYF1

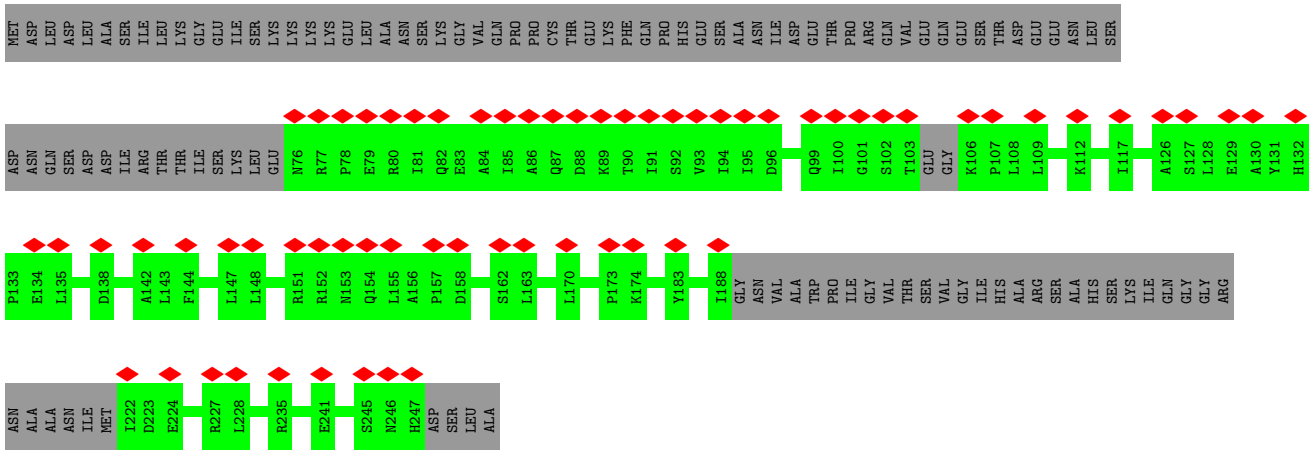
Chain T:





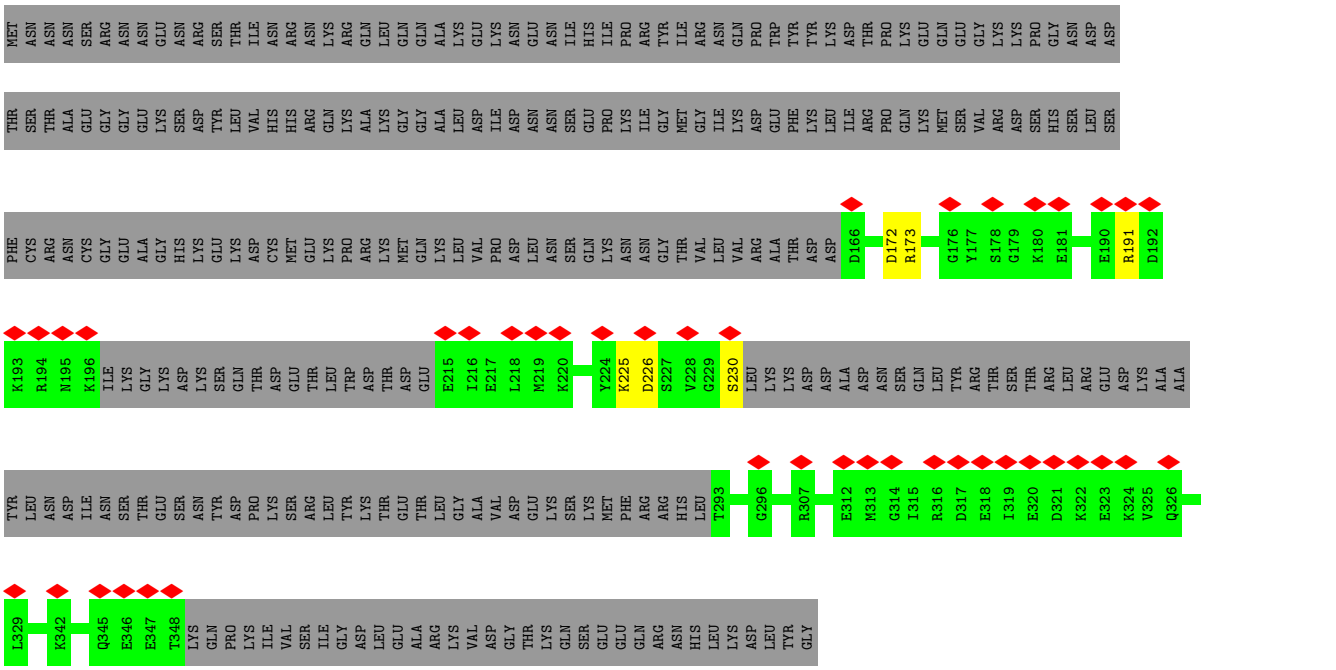
• Molecule 19: Pre-mRNA-splicing factor 18

Chain a:



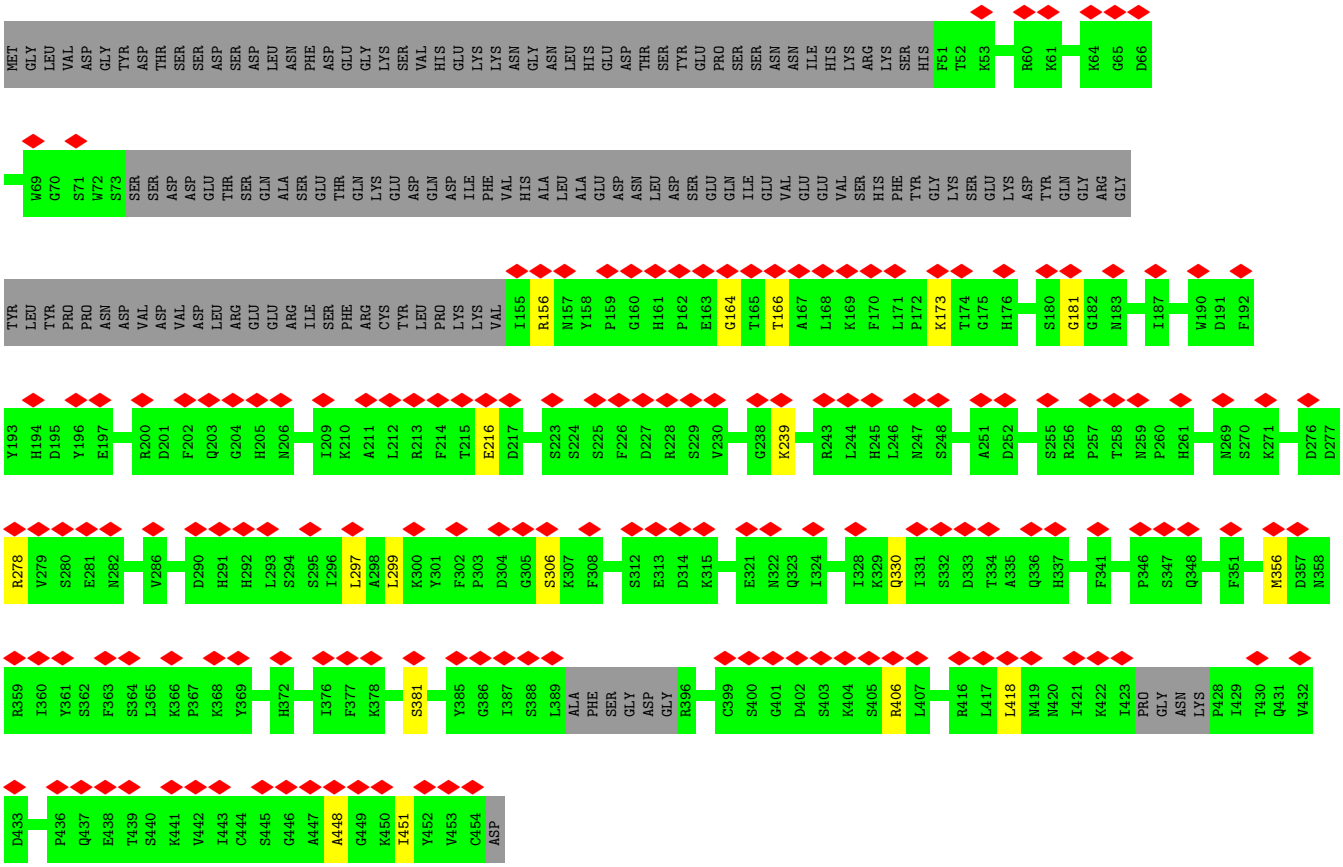
• Molecule 20: Pre-mRNA-splicing factor SLU7

Chain c:



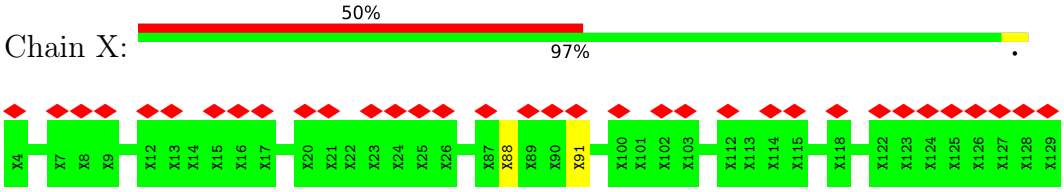
• Molecule 21: Pre-mRNA-processing factor 17

Chain o:



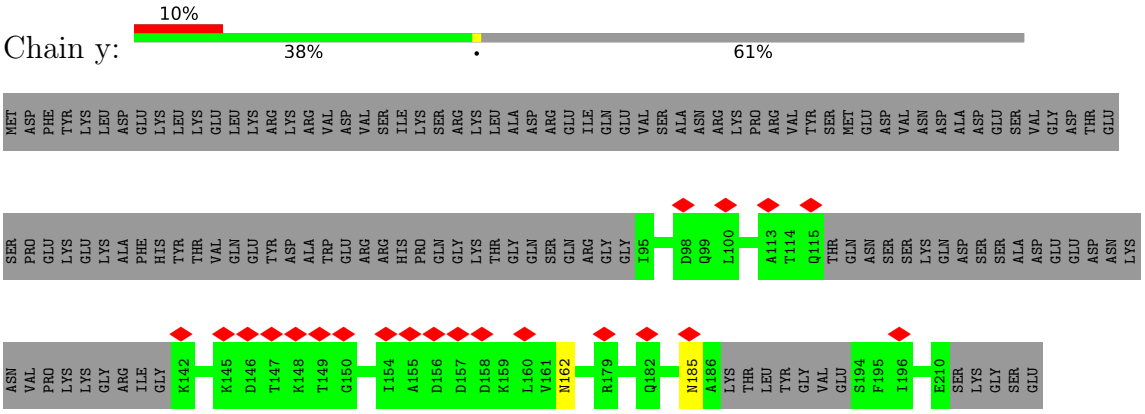
• Molecule 22: UNKNOWN PROTEIN

Chain X:



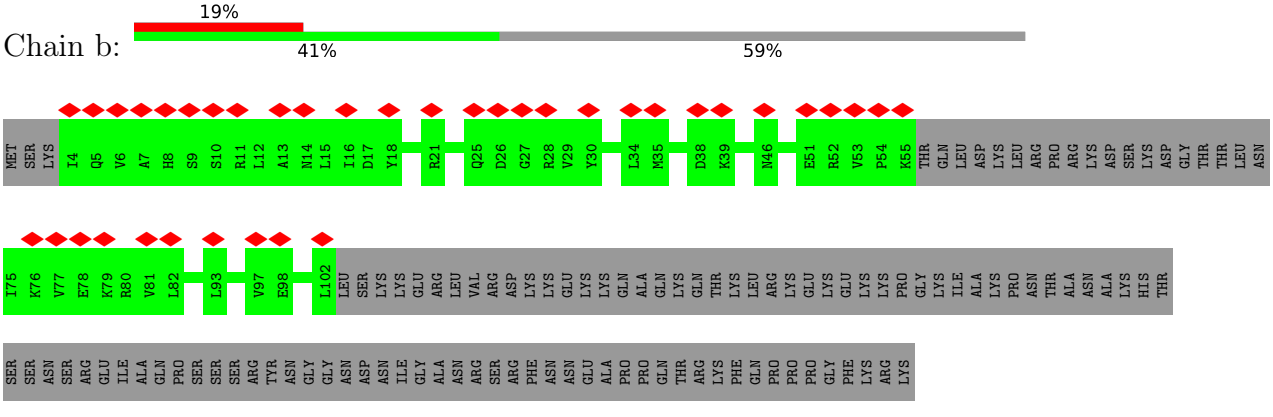
• Molecule 23: Pre-mRNA-splicing factor SYF2

Chain y:



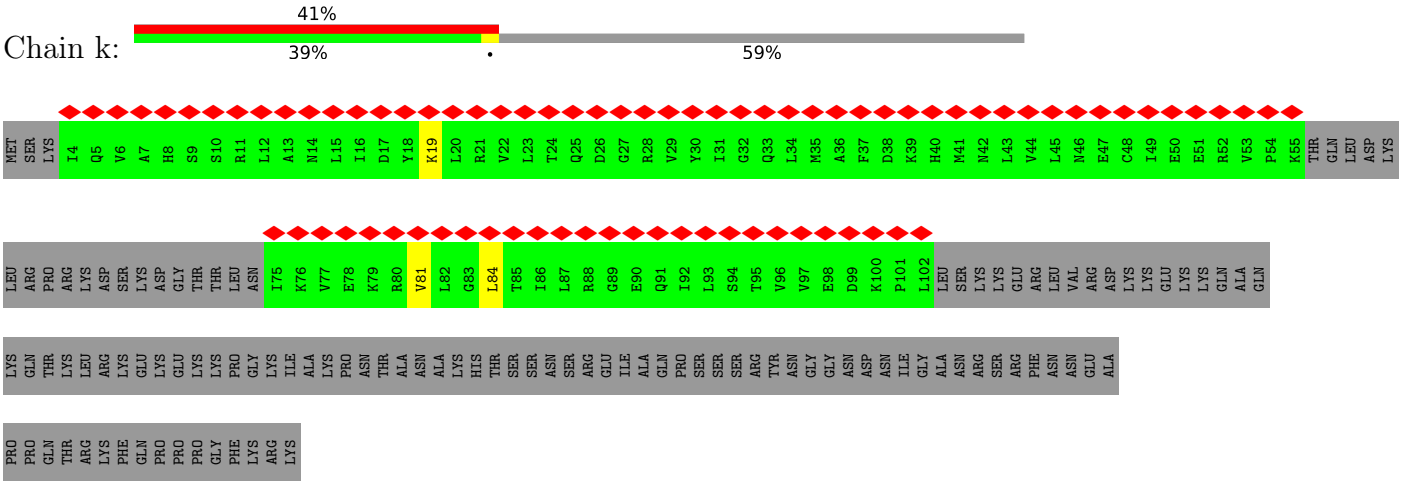
• Molecule 24: Small nuclear ribonucleoprotein-associated protein B

Chain b:



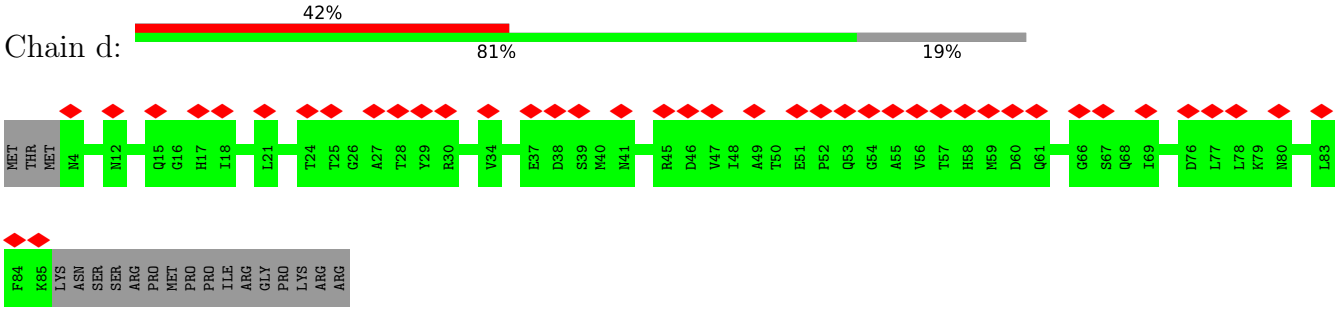
• Molecule 24: Small nuclear ribonucleoprotein-associated protein B

Chain k:



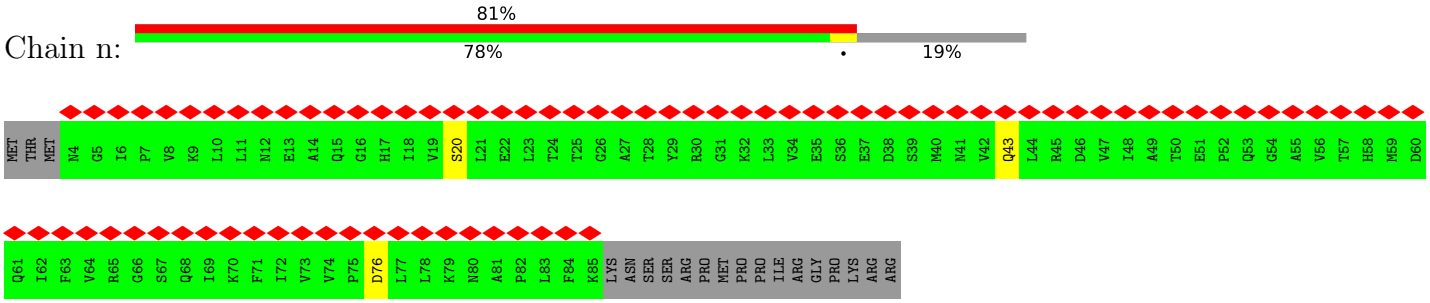
• Molecule 25: Small nuclear ribonucleoprotein Sm D3

Chain d:



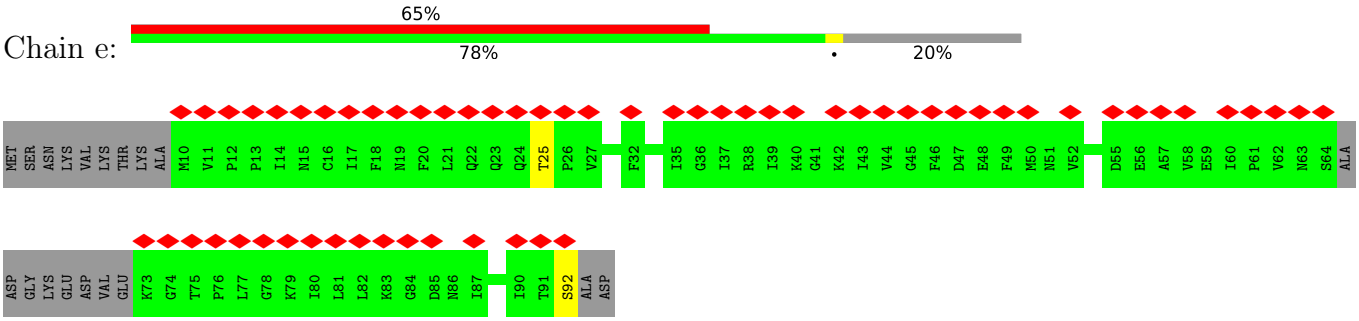
• Molecule 25: Small nuclear ribonucleoprotein Sm D3

Chain n:



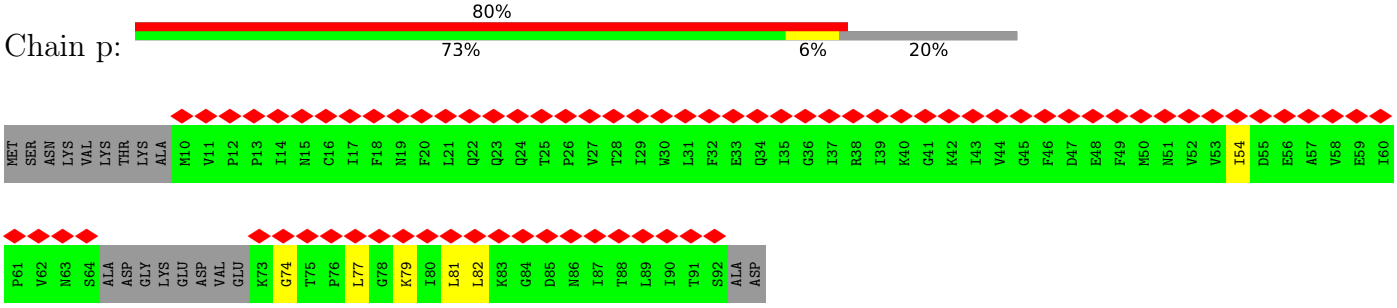
• Molecule 26: Small nuclear ribonucleoprotein E

Chain e:



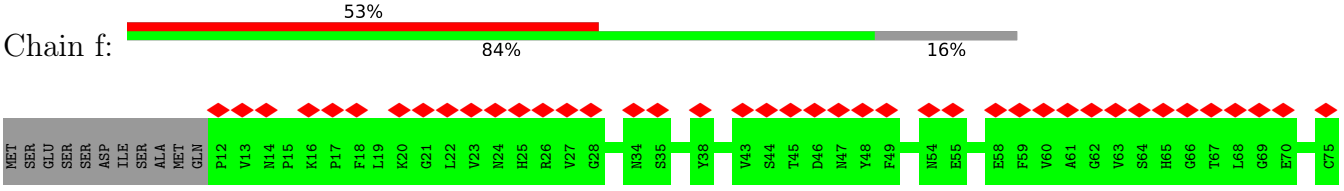
• Molecule 26: Small nuclear ribonucleoprotein E

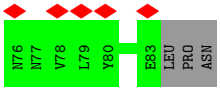
Chain p:



• Molecule 27: Small nuclear ribonucleoprotein F

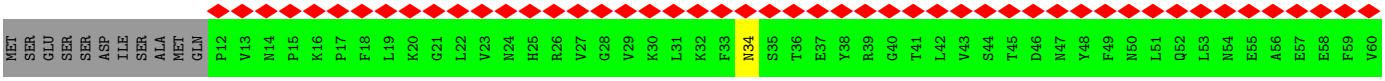
Chain f:

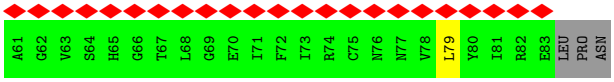




• Molecule 27: Small nuclear ribonucleoprotein F

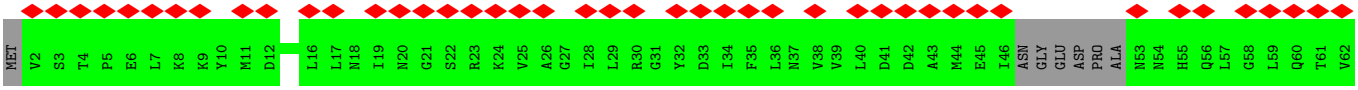
Chain q:

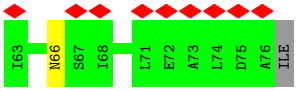




• Molecule 28: Small nuclear ribonucleoprotein G

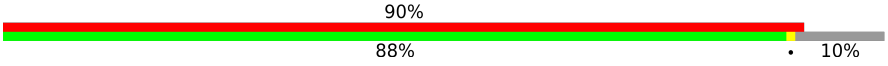
Chain g:

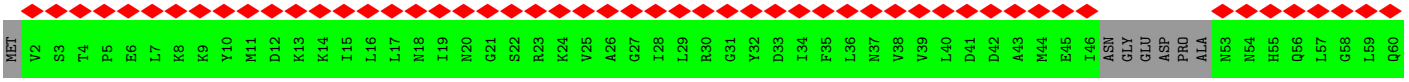


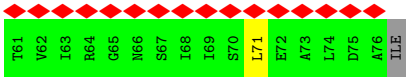


• Molecule 28: Small nuclear ribonucleoprotein G

Chain r:

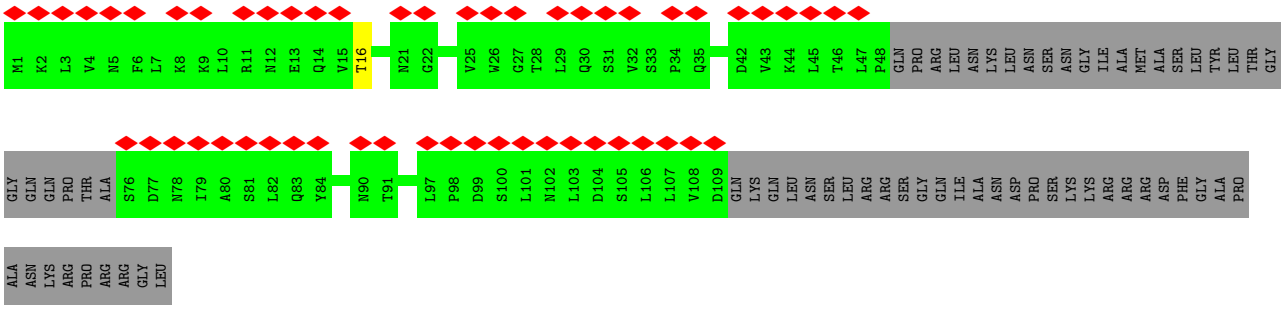






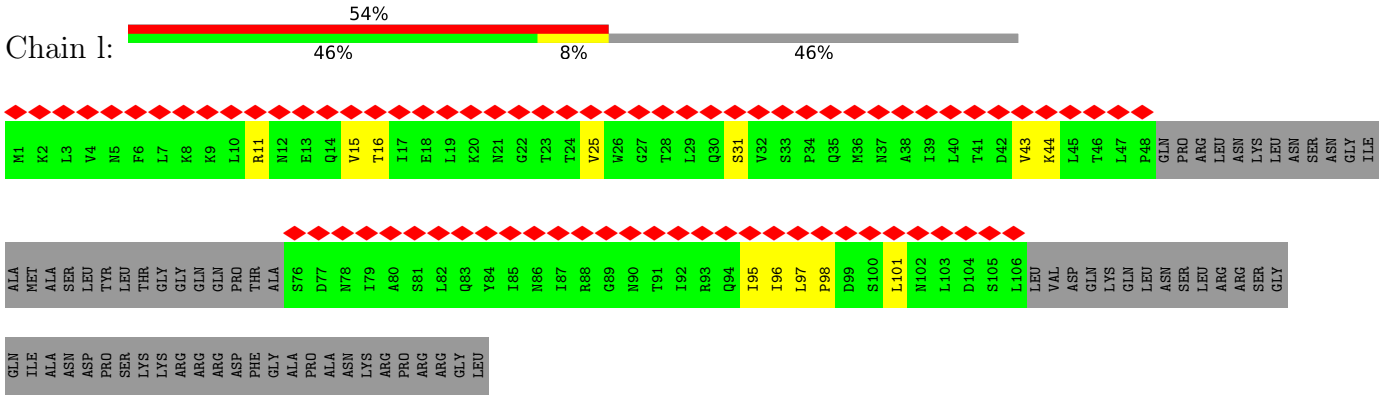
• Molecule 29: Small nuclear ribonucleoprotein Sm D1

Chain h:



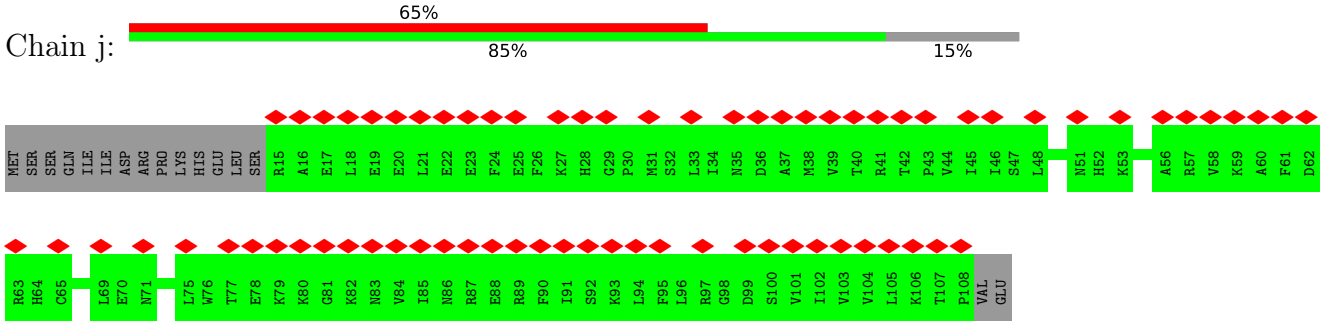
• Molecule 29: Small nuclear ribonucleoprotein Sm D1

Chain l:



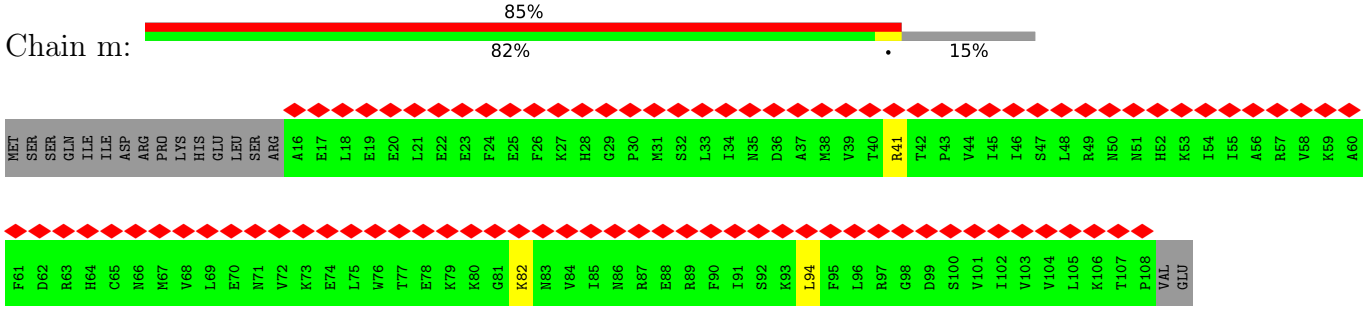
• Molecule 30: Small nuclear ribonucleoprotein Sm D2

Chain j:



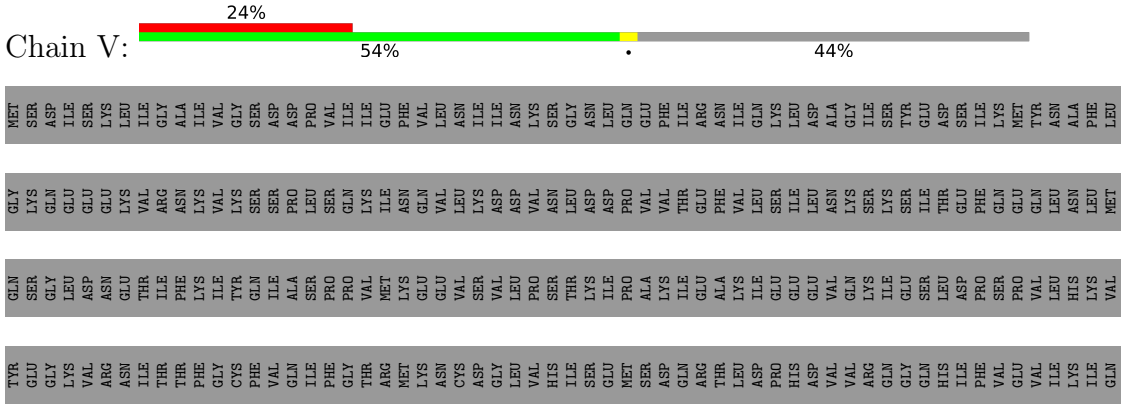
• Molecule 30: Small nuclear ribonucleoprotein Sm D2

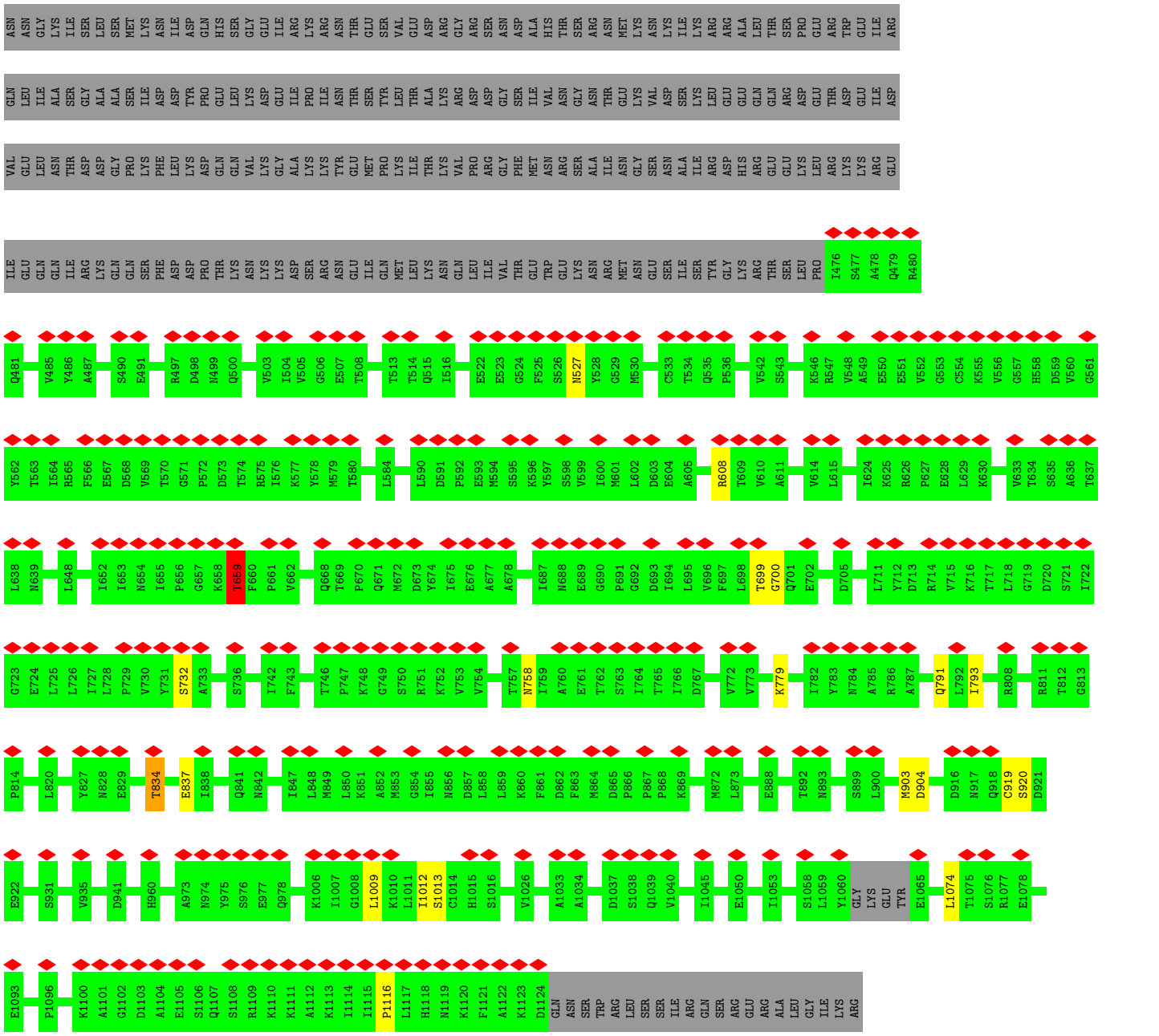
Chain m:



• Molecule 31: Pre-mRNA-splicing factor ATP-dependent RNA helicase PRP22

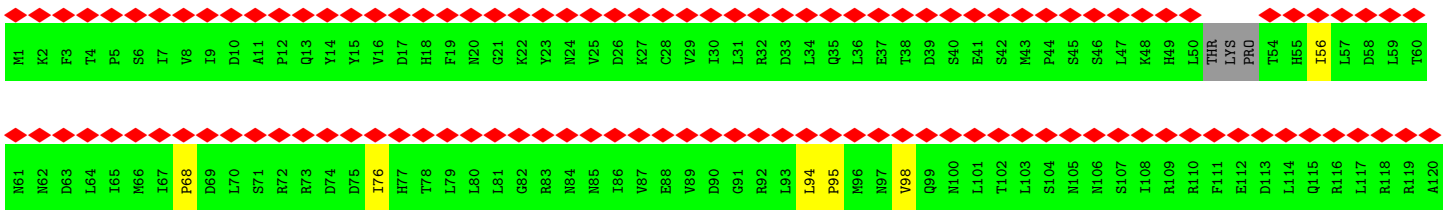
Chain V:

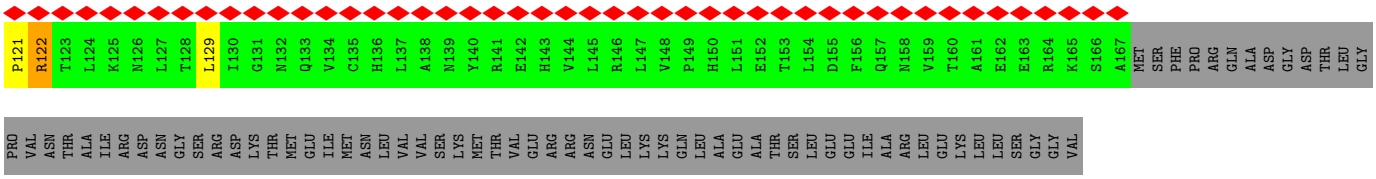




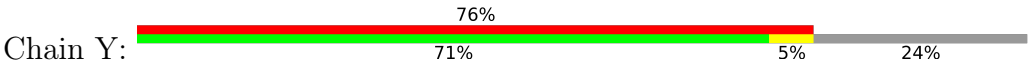
• Molecule 32: U2 small nuclear ribonucleoprotein A'

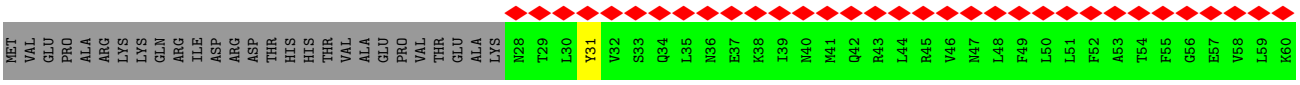
Chain W:

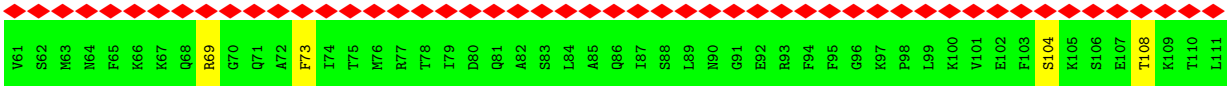




• Molecule 33: U2 small nuclear ribonucleoprotein B"

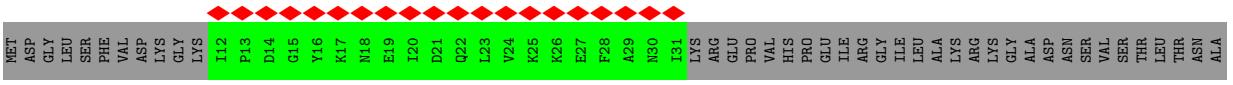


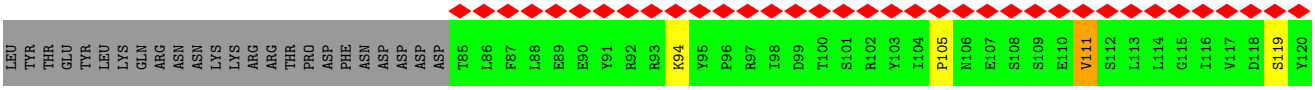


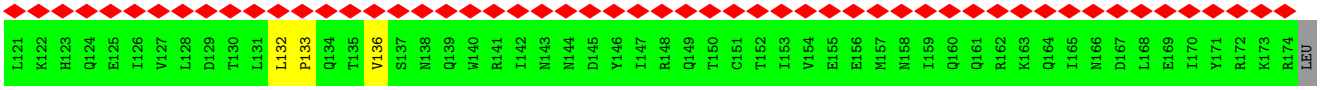


• Molecule 34: 3'-EXON OF UBC4 PRE-MRNA, BOUND BY PRP22 HELICASE

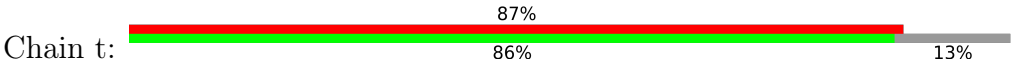
• Molecule 35: Pre-mRNA-splicing factor SNT309

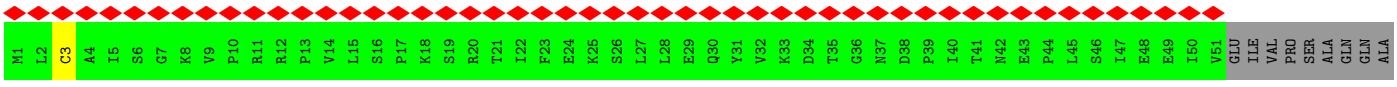


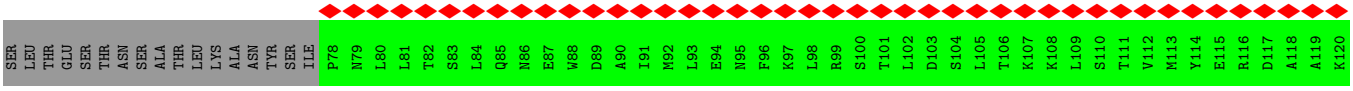


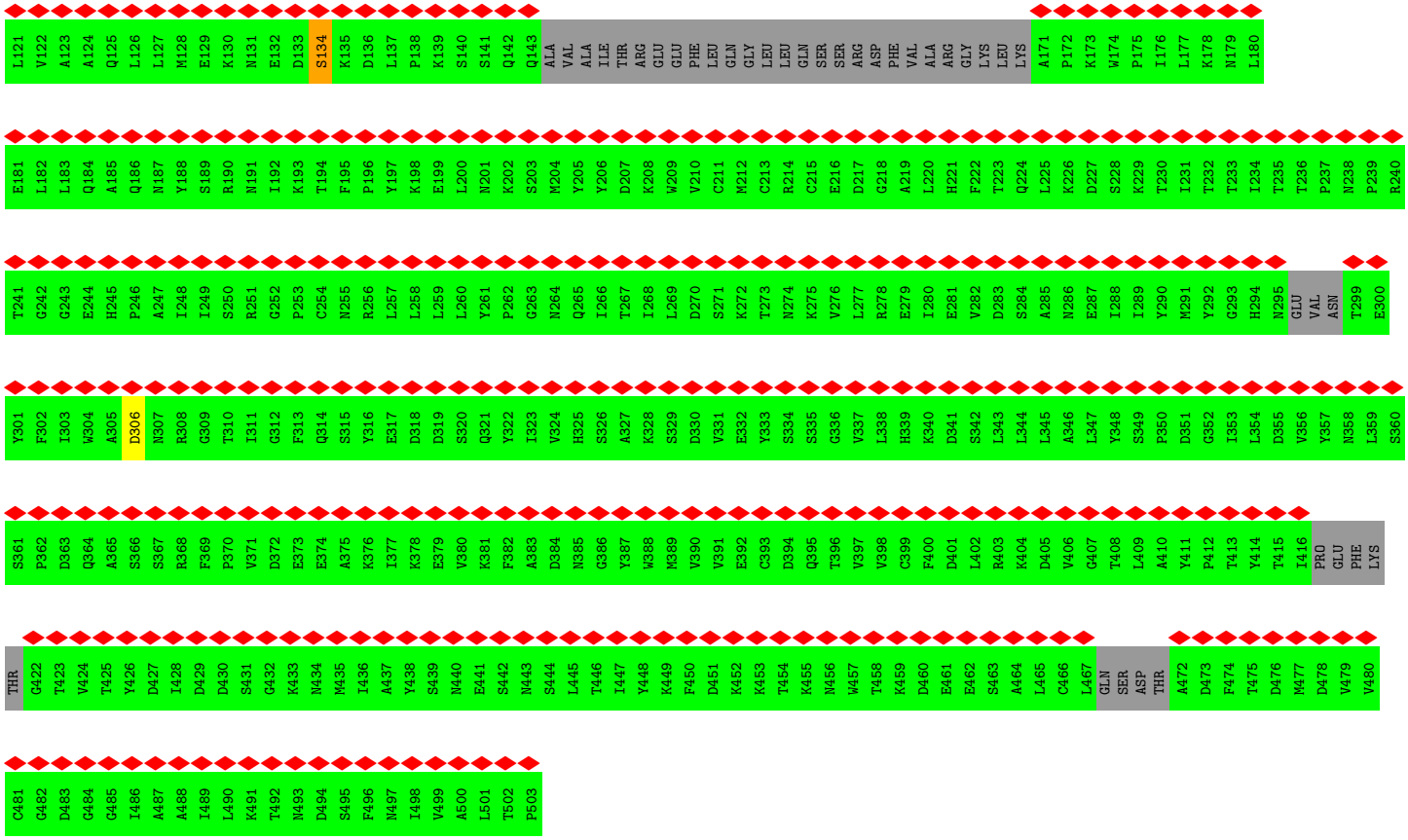


• Molecule 36: Pre-mRNA-processing factor 19



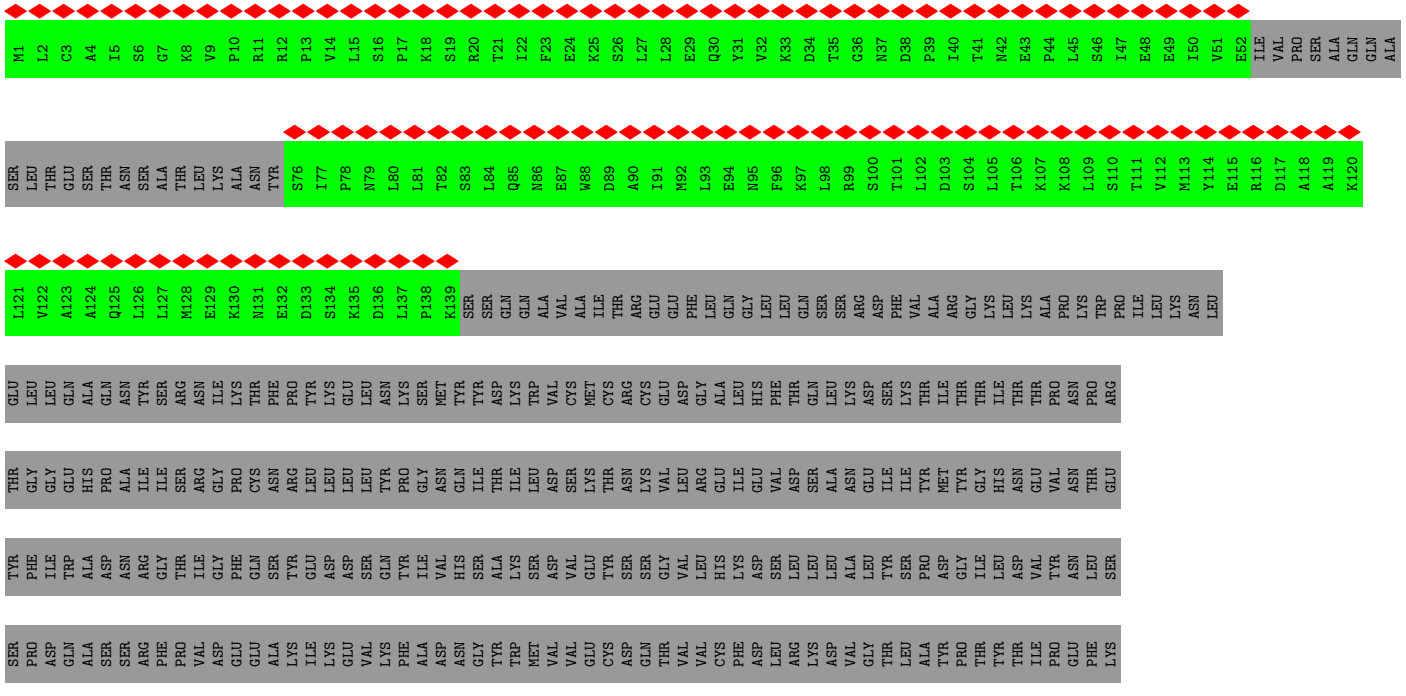


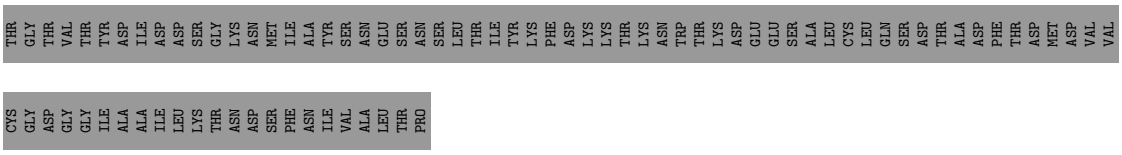




• Molecule 36: Pre-mRNA-processing factor 19

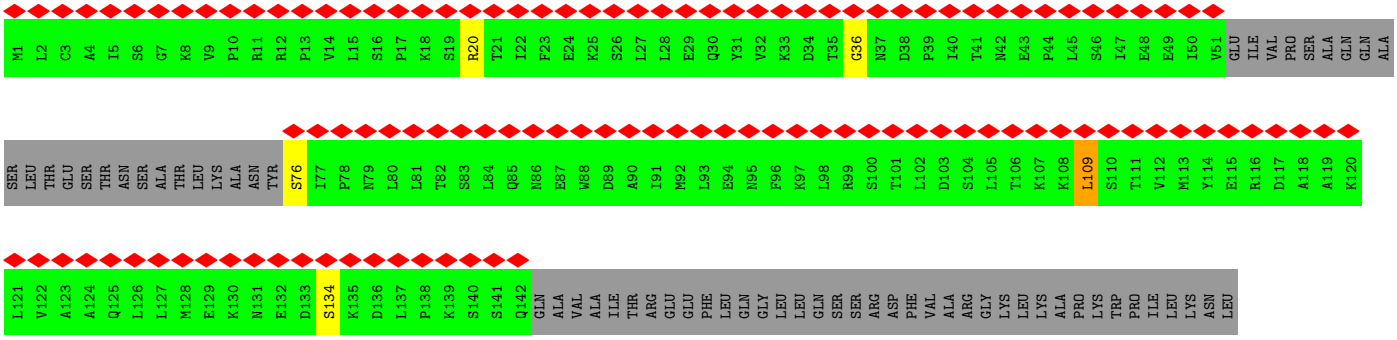
Chain u:





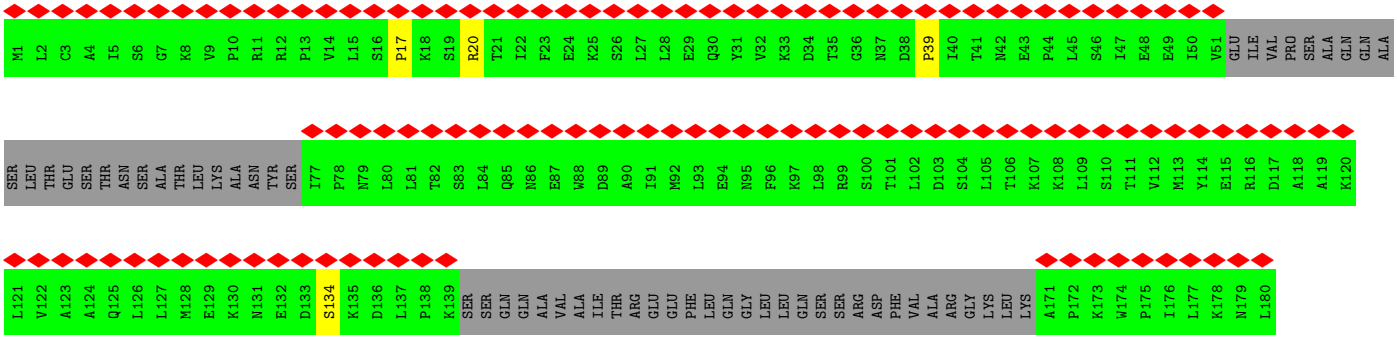
• Molecule 36: Pre-mRNA-processing factor 19

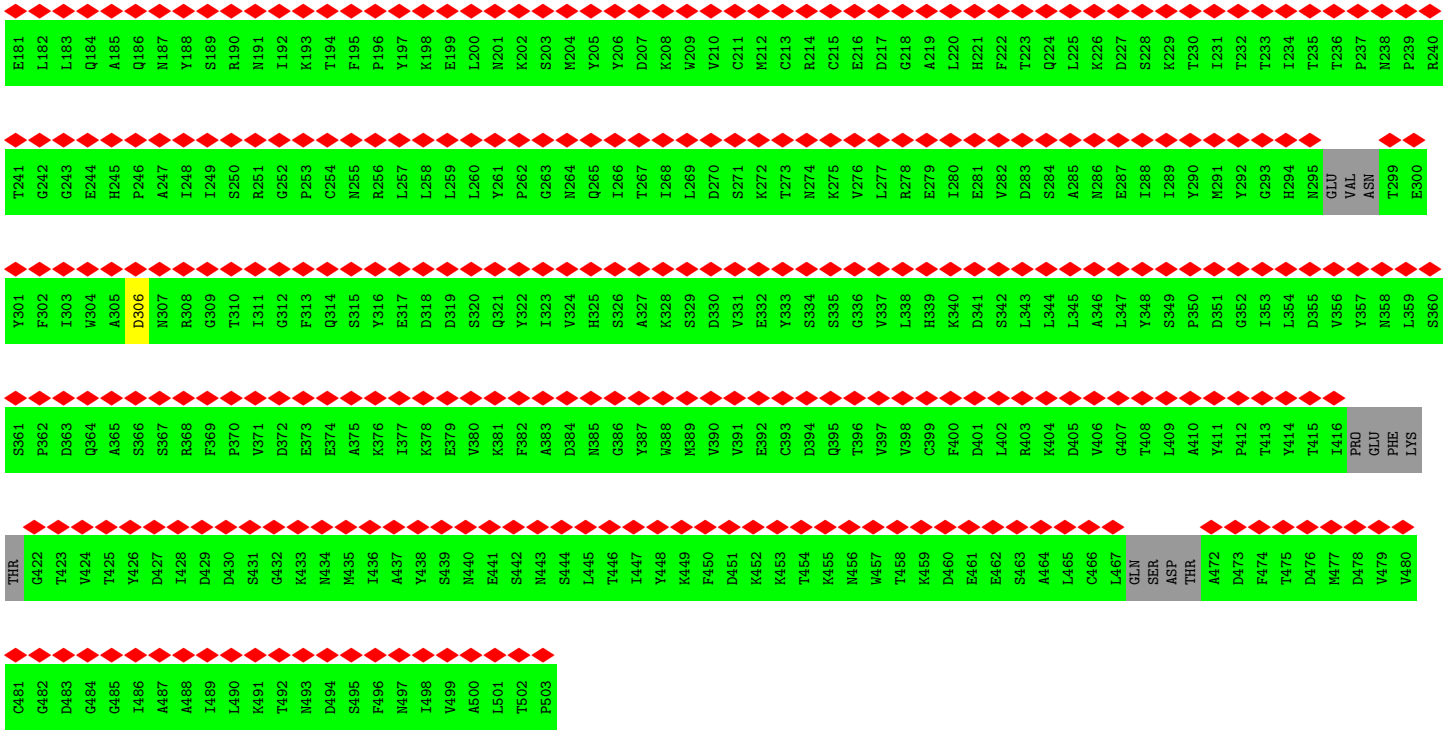
Chain v:



• Molecule 36: Pre-mRNA-processing factor 19

Chain w:




E181 L182 L183 Q184 A185 Q186 N187 Y188 S189 R190 N191 I192 K193 T194 F195 P196 Y197 K198 E199 L200 N201 K202 S203 M204 Y205 Y206 D207 K208 W209 V210 C211 M212 C213 R214 C215 E216 D217 G218 A219 L220 H221 F222 T223 Q224 L225 K226 D227 S228 K229 T230 I231 T232 T233 I234 T235 T236 P237 N238 P239 R240
T241 G242 G243 E244 H245 P246 A247 I248 I249 S250 R251 G252 P253 C254 N255 R256 L257 L258 L259 L260 Y261 P262 G263 N264 Q265 I266 T267 I268 L269 D270 S271 K272 T273 N274 K275 V276 L277 R278 E279 I280 E281 V282 D283 S284 A285 N286 E287 I288 I289 Y290 M291 Y292 G293 H294 N295 GLU VAL ASN T299 E300
Y301 F302 I303 W304 A305 D306 N307 R308 G309 T310 I311 G312 F313 Q314 S315 Y316 E317 D318 D319 S320 Q321 Y322 I323 V324 H325 S326 A327 K328 S329 D330 V331 E332 Y333 S334 S335 G336 V337 L338 H339 K340 D341 S342 L343 L344 L345 A346 L347 Y348 S349 P350 D351 G352 I353 L354 D355 V356 Y357 N358 L359 S360
S361 P362 D363 Q364 A365 S366 S367 R368 F369 P370 V371 D372 E373 E374 A375 K376 I377 K378 E379 V380 K381 F382 A383 D384 N385 G386 Y387 W388 M389 V390 V391 E392 C393 D394 Q395 T396 V397 V398 C399 F400 D401 L402 R403 K404 D405 V406 G407 T408 L409 A410 Y411 P412 T413 Y414 T415 I416 PRO GLU PHE LYS
THR G422 T423 V424 T425 Y426 D427 I428 D429 D430 S431 G432 K433 N434 M435 I436 A437 Y438 S439 N440 E441 S442 N443 S444 L445 T446 I447 Y448 K449 F450 D451 K452 K453 T454 K455 N456 W457 T458 K459 D460 E461 E462 S463 A464 L465 C466 L467 GLN SER ASP THR A472 D473 F474 T475 D476 M477 D478 V479 V480
C481 G482 D483 G484 G485 I486 A487 A488 I489 L490 K491 T492 N493 D494 S495 F496 N497 I498 V499 A500 L501 T502 P503

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	29527	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 ($e^-/Å^2$)	2	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	4500	Depositor
Magnification	81000	Depositor
Image detector	GATAN K2 SUMMIT (4k x 4k)	Depositor
Maximum map value	0.094	Depositor
Minimum map value	-0.033	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.003	Depositor
Recommended contour level	0.03	Depositor
Map size (Å)	589.16, 589.16, 589.16	wwPDB
Map dimensions	412, 412, 412	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.43, 1.43, 1.43	Depositor

5 Model quality

5.1 Standard geometry

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

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	I	0.33	0/795	0.83	1/1231 (0.1%)
2	E	0.34	0/388	0.78	0/603
3	2	0.27	0/3639	0.72	0/5643
4	6	0.33	0/2357	0.72	1/3667 (0.0%)
5	5	0.32	0/3351	0.73	0/5213
6	A	0.46	0/15598	0.73	0/21212
7	C	0.42	0/6703	0.69	0/9138
8	H	0.48	0/3314	0.77	0/4463
9	J	0.47	0/2749	0.74	0/3735
10	K	0.44	0/1480	0.75	0/2000
11	L	0.46	0/1186	0.72	0/1606
12	M	0.41	0/2062	0.66	0/2772
13	N	0.41	0/1823	0.71	0/2456
14	O	0.46	0/1781	0.78	0/2385
15	P	0.39	0/580	0.66	0/776
16	R	0.41	0/617	0.68	0/848
17	S	0.47	0/3269	0.76	0/4446
18	T	0.42	0/3036	0.71	0/4197
19	a	0.38	0/1141	0.61	0/1546
20	c	0.45	1/798 (0.1%)	0.60	0/1074
21	o	0.41	0/2491	0.64	0/3384
23	y	0.34	0/681	0.54	0/902
24	b	0.36	0/636	0.63	0/856
24	k	0.35	0/636	0.58	0/856
25	d	0.35	0/634	0.56	0/859
25	n	0.37	0/634	0.53	0/859
26	e	0.41	0/585	0.61	0/795
26	p	0.40	0/585	0.56	0/795
27	f	0.40	0/585	0.57	0/791
27	q	0.40	0/585	0.61	0/791
28	g	0.50	0/532	0.61	0/715
28	r	0.35	0/529	0.50	0/711

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#|Z| >5	RMSZ	#|Z| >5
29	h	0.38	0/649	0.54	0/880
29	l	0.40	0/623	0.64	0/844
30	j	0.36	0/753	0.57	0/1013
30	m	0.37	0/738	0.61	0/995
31	V	0.57	2/3186 (0.1%)	1.53	9/4434 (0.2%)
32	W	0.31	0/814	0.53	0/1134
33	Y	0.32	0/415	0.55	0/577
34	3	0.19	0/65	0.65	0/98
35	s	0.57	0/546	0.80	0/760
36	t	0.46	0/2165	0.71	3/3010 (0.1%)
36	u	0.57	0/576	0.78	0/802
36	v	0.59	0/586	0.89	3/816 (0.4%)
36	w	0.47	0/2150	0.68	2/2989 (0.1%)
All	All	0.43	3/79046 (0.0%)	0.76	19/109677 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
7	C	0	1
9	J	0	1
15	P	0	1
21	o	0	1
24	k	0	1
31	V	0	3
35	s	0	2
36	t	0	2
36	v	0	1
36	w	0	1
All	All	0	14

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
31	V	1009	LEU	C-N	7.26	1.50	1.34
20	c	230	SER	C-O	6.14	1.35	1.23
31	V	834	THR	C-N	-5.27	1.22	1.34

The worst 5 of 19 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
31	V	834	THR	C-N-CA	-46.64	5.11	121.70
31	V	834	THR	CA-C-N	-38.77	31.91	117.20
31	V	1009	LEU	O-C-N	27.39	166.52	122.70
31	V	1009	LEU	CA-C-N	-22.51	67.67	117.20
31	V	1009	LEU	C-N-CA	-18.95	74.32	121.70

There are no chirality outliers.

5 of 14 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
7	C	105	ILE	Peptide
9	J	194	HIS	Peptide
15	P	5	HIS	Peptide
31	V	659	THR	Mainchain
21	o	239	LYS	Peptide

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	I	714	0	361	6	0
2	E	346	0	173	11	0
3	2	3271	0	1660	26	0
4	6	2108	0	1063	29	0
5	5	2999	0	1515	34	0
6	A	15199	0	14954	262	0
7	C	6562	0	6486	105	0
8	H	3261	0	3323	91	0
9	J	2690	0	2690	85	0
10	K	1458	0	1468	20	0
11	L	1162	0	1111	19	0
12	M	2016	0	1985	32	0
13	N	1798	0	1842	38	0
14	O	1755	0	1794	24	0
15	P	565	0	555	7	0
16	R	614	0	390	8	0
17	S	3229	0	2573	37	0
18	T	3154	0	1331	94	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
19	a	1119	0	1164	0	0
20	c	786	0	719	0	0
21	o	2425	0	2253	0	0
22	X	338	0	70	1	0
23	y	679	0	706	0	0
24	b	631	0	670	0	0
24	k	631	0	665	0	0
25	d	625	0	647	0	0
25	n	625	0	647	0	0
26	e	575	0	597	0	0
26	p	575	0	597	0	0
27	f	573	0	572	0	0
27	q	573	0	572	0	0
28	g	529	0	557	0	0
28	r	526	0	555	0	0
29	h	644	0	686	0	0
29	l	618	0	660	0	0
30	j	741	0	778	0	0
30	m	726	0	754	0	0
31	V	3189	0	1412	12	0
32	W	816	0	340	1	0
33	Y	416	0	182	14	0
34	3	60	0	31	10	0
35	s	548	0	219	0	0
36	t	2171	0	945	0	0
36	u	578	0	246	0	0
36	v	588	0	250	0	0
36	w	2156	0	938	0	0
37	6	3	0	0	0	0
38	6	2	0	0	0	0
39	A	36	0	6	0	0
40	C	32	0	12	0	0
41	L	3	0	0	0	0
41	M	1	0	0	0	0
41	N	2	0	0	0	0
All	All	77441	0	63724	846	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 8.

The worst 5 of 846 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
18:T:119:ALA:HB2	18:T:131:ALA:CB	1.25	1.63
18:T:119:ALA:CB	18:T:131:ALA:HB3	1.40	1.48
18:T:237:THR:N	18:T:240:ASN:N	1.73	1.34
18:T:300:ASP:CB	18:T:303:LEU:CB	2.06	1.33
18:T:119:ALA:HB1	18:T:128:ILE:CA	1.58	1.33

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
6	A	1906/2413 (79%)	1733 (91%)	161 (8%)	12 (1%)	25	64
7	C	864/1008 (86%)	771 (89%)	87 (10%)	6 (1%)	22	62
8	H	393/577 (68%)	353 (90%)	36 (9%)	4 (1%)	15	53
9	J	340/451 (75%)	295 (87%)	39 (12%)	6 (2%)	8	42
10	K	183/379 (48%)	163 (89%)	17 (9%)	3 (2%)	9	45
11	L	153/157 (98%)	136 (89%)	16 (10%)	1 (1%)	22	62
12	M	250/339 (74%)	236 (94%)	12 (5%)	2 (1%)	19	59
13	N	217/364 (60%)	191 (88%)	22 (10%)	4 (2%)	8	42
14	O	207/590 (35%)	193 (93%)	11 (5%)	3 (1%)	11	47
15	P	63/175 (36%)	56 (89%)	7 (11%)	0	100	100
16	R	104/135 (77%)	91 (88%)	12 (12%)	1 (1%)	15	53
17	S	438/687 (64%)	415 (95%)	20 (5%)	3 (1%)	22	62
18	T	557/877 (64%)	532 (96%)	22 (4%)	3 (0%)	29	68
19	a	131/251 (52%)	123 (94%)	8 (6%)	0	100	100
20	c	97/382 (25%)	87 (90%)	8 (8%)	2 (2%)	7	39
21	o	305/455 (67%)	251 (82%)	46 (15%)	8 (3%)	5	35

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
23	y	77/215 (36%)	76 (99%)	1 (1%)	0	100	100
24	b	76/196 (39%)	74 (97%)	2 (3%)	0	100	100
24	k	76/196 (39%)	68 (90%)	7 (9%)	1 (1%)	12	48
25	d	80/101 (79%)	73 (91%)	7 (9%)	0	100	100
25	n	80/101 (79%)	74 (92%)	6 (8%)	0	100	100
26	e	71/94 (76%)	62 (87%)	9 (13%)	0	100	100
26	p	71/94 (76%)	66 (93%)	4 (6%)	1 (1%)	11	47
27	f	70/86 (81%)	61 (87%)	9 (13%)	0	100	100
27	q	70/86 (81%)	65 (93%)	5 (7%)	0	100	100
28	g	65/77 (84%)	63 (97%)	2 (3%)	0	100	100
28	r	65/77 (84%)	57 (88%)	8 (12%)	0	100	100
29	h	78/146 (53%)	71 (91%)	7 (9%)	0	100	100
29	l	75/146 (51%)	65 (87%)	8 (11%)	2 (3%)	5	34
30	j	92/110 (84%)	83 (90%)	9 (10%)	0	100	100
30	m	91/110 (83%)	84 (92%)	7 (8%)	0	100	100
31	V	639/1145 (56%)	602 (94%)	34 (5%)	3 (0%)	29	68
32	W	160/238 (67%)	117 (73%)	35 (22%)	8 (5%)	2	23
33	Y	82/111 (74%)	76 (93%)	6 (7%)	0	100	100
35	s	106/175 (61%)	92 (87%)	8 (8%)	6 (6%)	1	21
36	t	426/503 (85%)	417 (98%)	9 (2%)	0	100	100
36	u	112/503 (22%)	104 (93%)	8 (7%)	0	100	100
36	v	114/503 (23%)	108 (95%)	3 (3%)	3 (3%)	5	35
36	w	423/503 (84%)	414 (98%)	7 (2%)	2 (0%)	29	68
All	All	9407/14756 (64%)	8598 (91%)	725 (8%)	84 (1%)	21	55

5 of 84 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
6	A	487	ASN
6	A	742	VAL
6	A	1620	TYR
7	C	568	SER
7	C	901	GLU

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	
6	A	1577/2182 (72%)	1549 (98%)	28 (2%)	59	76
7	C	681/910 (75%)	662 (97%)	19 (3%)	43	65
8	H	366/538 (68%)	357 (98%)	9 (2%)	47	68
9	J	299/397 (75%)	280 (94%)	19 (6%)	17	44
10	K	159/328 (48%)	152 (96%)	7 (4%)	28	54
11	L	112/141 (79%)	105 (94%)	7 (6%)	18	45
12	M	214/296 (72%)	210 (98%)	4 (2%)	57	74
13	N	211/332 (64%)	205 (97%)	6 (3%)	43	65
14	O	187/525 (36%)	181 (97%)	6 (3%)	39	62
15	P	56/151 (37%)	54 (96%)	2 (4%)	35	60
16	R	25/121 (21%)	24 (96%)	1 (4%)	31	56
17	S	230/633 (36%)	221 (96%)	9 (4%)	32	57
18	T	1/786 (0%)	1 (100%)	0	100	100
19	a	125/225 (56%)	125 (100%)	0	100	100
20	c	71/346 (20%)	68 (96%)	3 (4%)	30	55
21	o	256/413 (62%)	247 (96%)	9 (4%)	36	60
23	y	76/193 (39%)	74 (97%)	2 (3%)	46	66
24	b	70/176 (40%)	70 (100%)	0	100	100
24	k	70/176 (40%)	69 (99%)	1 (1%)	67	80
25	d	69/89 (78%)	69 (100%)	0	100	100
25	n	69/89 (78%)	66 (96%)	3 (4%)	29	55
26	e	65/83 (78%)	63 (97%)	2 (3%)	40	62
26	p	65/83 (78%)	60 (92%)	5 (8%)	13	39
27	f	63/77 (82%)	63 (100%)	0	100	100
27	q	63/77 (82%)	61 (97%)	2 (3%)	39	62
28	g	58/66 (88%)	57 (98%)	1 (2%)	60	78

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
28	r	57/66 (86%)	56 (98%)	1 (2%)	59 76
29	h	77/129 (60%)	76 (99%)	1 (1%)	69 82
29	l	73/129 (57%)	63 (86%)	10 (14%)	3 20
30	j	79/103 (77%)	79 (100%)	0	100 100
30	m	77/103 (75%)	74 (96%)	3 (4%)	32 57
All	All	5601/9963 (56%)	5441 (97%)	160 (3%)	45 64

5 of 160 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
17	S	237	ILE
29	l	96	ILE
20	c	225	LYS
23	y	185	ASN
25	n	43	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 59 such sidechains are listed below:

Mol	Chain	Res	Type
9	J	271	GLN
29	l	21	ASN
12	M	12	GLN
29	l	14	GLN
21	o	330	GLN

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
1	I	32/95 (33%)	14 (43%)	4 (12%)
2	E	15/20 (75%)	5 (33%)	1 (6%)
3	2	146/1175 (12%)	49 (33%)	5 (3%)
34	3	2/3 (66%)	2 (100%)	0
4	6	98/112 (87%)	37 (37%)	3 (3%)
5	5	138/179 (77%)	61 (44%)	3 (2%)
All	All	431/1584 (27%)	168 (38%)	16 (3%)

5 of 168 RNA backbone outliers are listed below:

Mol	Chain	Res	Type
1	I	2	U
1	I	3	A
1	I	4	U
1	I	10	A
1	I	11	A

5 of 16 RNA pucker outliers are listed below:

Mol	Chain	Res	Type
5	5	39	U
5	5	27	G
3	2	1124	U
4	6	92	C
3	2	1123	C

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 13 ligands modelled in this entry, 11 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	$\#\|Z\| > 2$
39	IHP	A	3001	-	36,36,36	0.71	0	54,60,60	1.08	4 (7%)
40	GTP	C	1101	-	26,34,34	0.83	1 (3%)	32,54,54	1.83	7 (21%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
39	IHP	A	3001	-	-	0/30/54/54	0/1/1/1
40	GTP	C	1101	-	-	6/18/38/38	0/3/3/3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
40	C	1101	GTP	C6-N1	-2.01	1.34	1.37

The worst 5 of 11 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
40	C	1101	GTP	PB-O3B-PG	-5.83	112.82	132.83
40	C	1101	GTP	PA-O3A-PB	-4.08	118.81	132.83
39	A	3001	IHP	C3-C2-C1	2.87	116.69	110.41
40	C	1101	GTP	C5-C6-N1	2.83	118.96	113.95
40	C	1101	GTP	C3'-C2'-C1'	2.49	104.73	100.98

There are no chirality outliers.

5 of 6 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
40	C	1101	GTP	C5'-O5'-PA-O1A
40	C	1101	GTP	O4'-C4'-C5'-O5'
40	C	1101	GTP	C3'-C4'-C5'-O5'
40	C	1101	GTP	C4'-C5'-O5'-PA
40	C	1101	GTP	C5'-O5'-PA-O3A

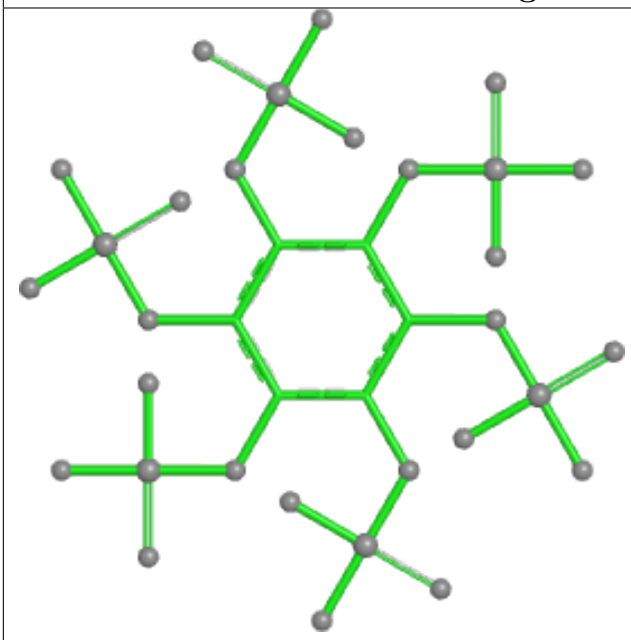
There are no ring outliers.

No monomer is involved in short contacts.

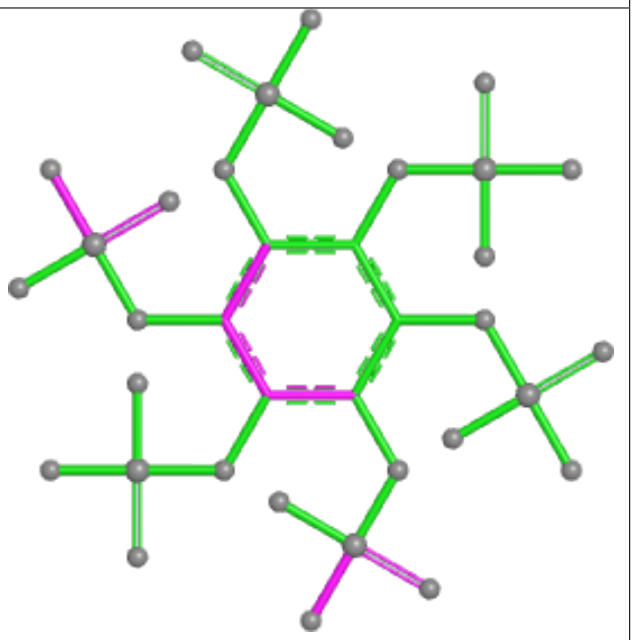
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and

any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

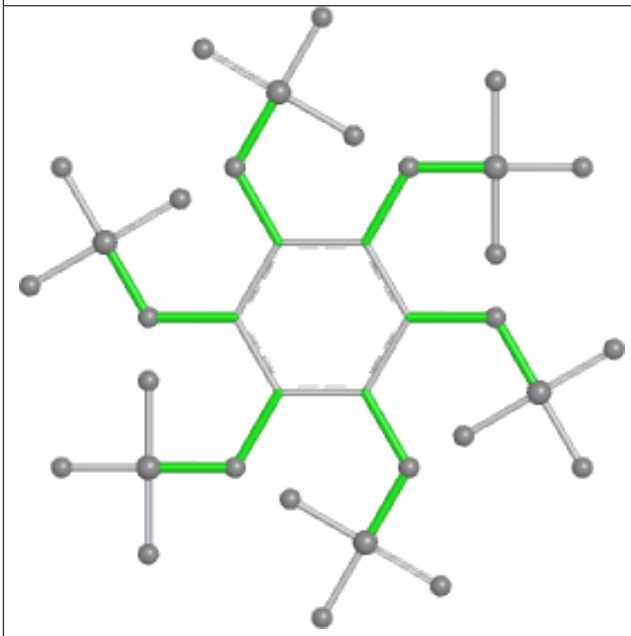
Ligand IHP A 3001



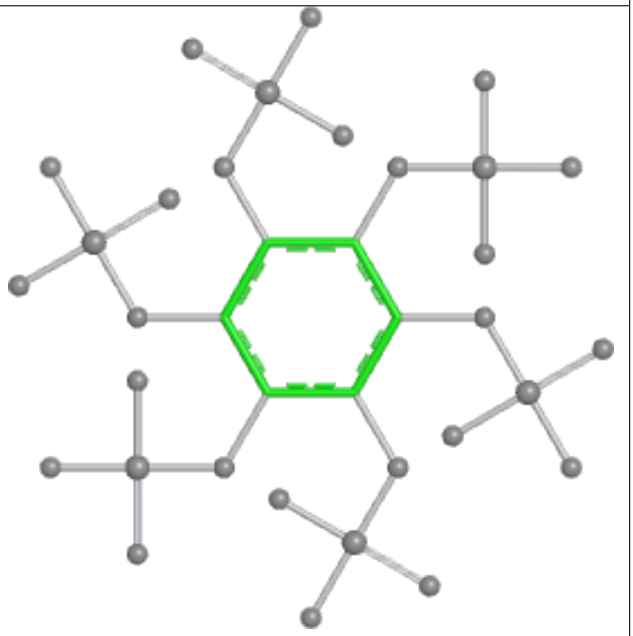
Bond lengths



Bond angles

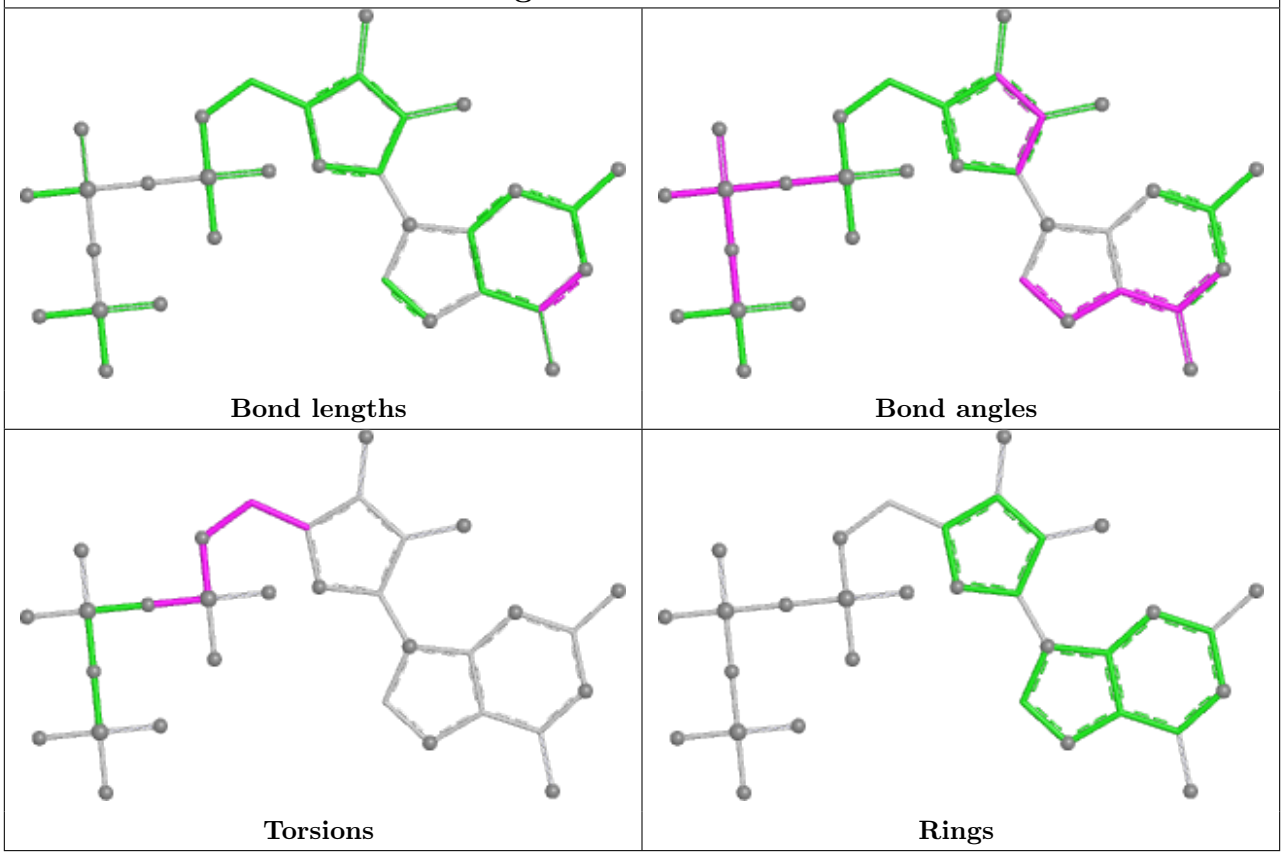


Torsions



Rings

Ligand GTP C 1101



5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

The following chains have linkage breaks:

Mol	Chain	Number of breaks
22	X	1
31	V	1
18	T	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	X	27:UNK	C	86:UNK	N	8.48
1	V	903:MET	C	904:ASP	N	2.35
1	T	300:ASP	C	301:LYS	N	2.16

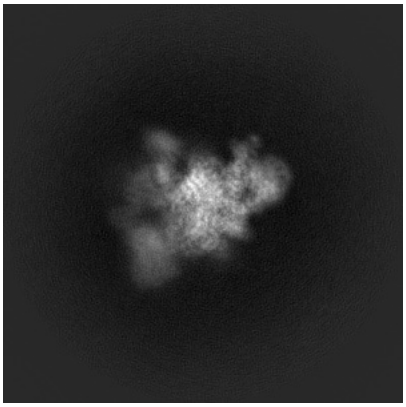
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-3541. These allow visual inspection of the internal detail of the map and identification of artifacts.

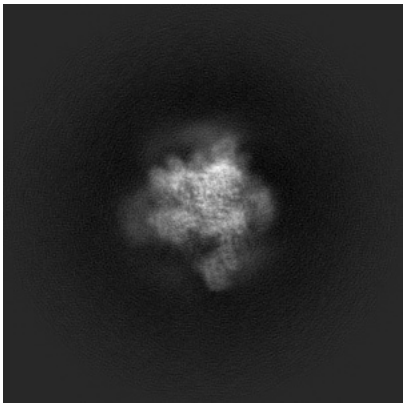
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections

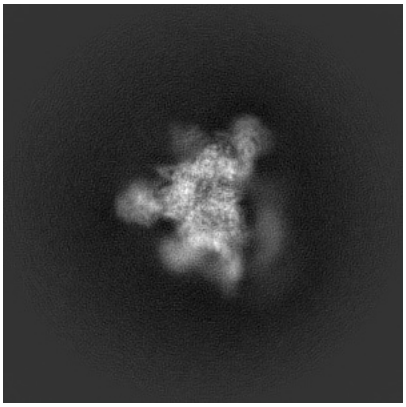
6.1.1 Primary map



X



Y

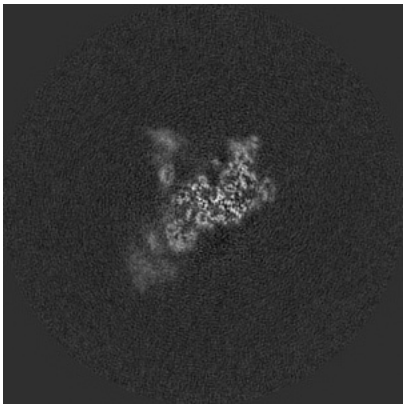


Z

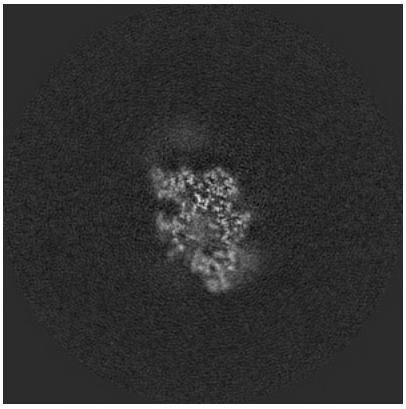
The images above show the map projected in three orthogonal directions.

6.2 Central slices

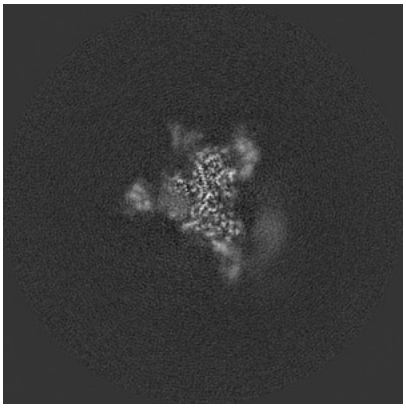
6.2.1 Primary map



X Index: 206



Y Index: 206

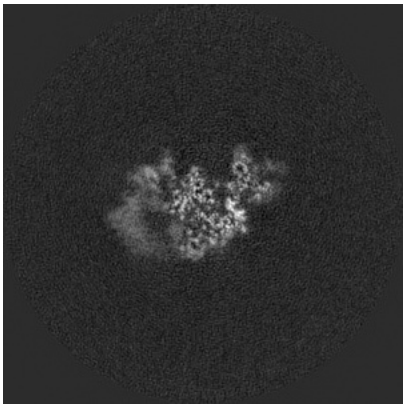


Z Index: 206

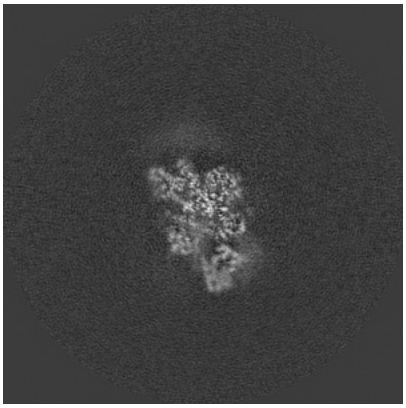
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

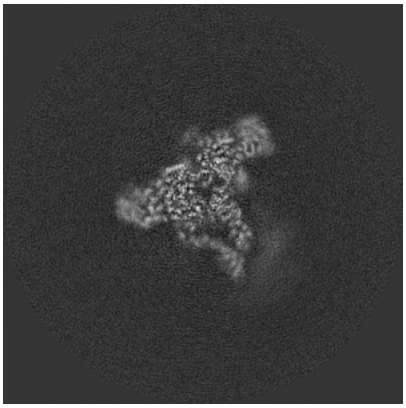
6.3.1 Primary map



X Index: 234



Y Index: 201



Z Index: 227

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 0.03. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

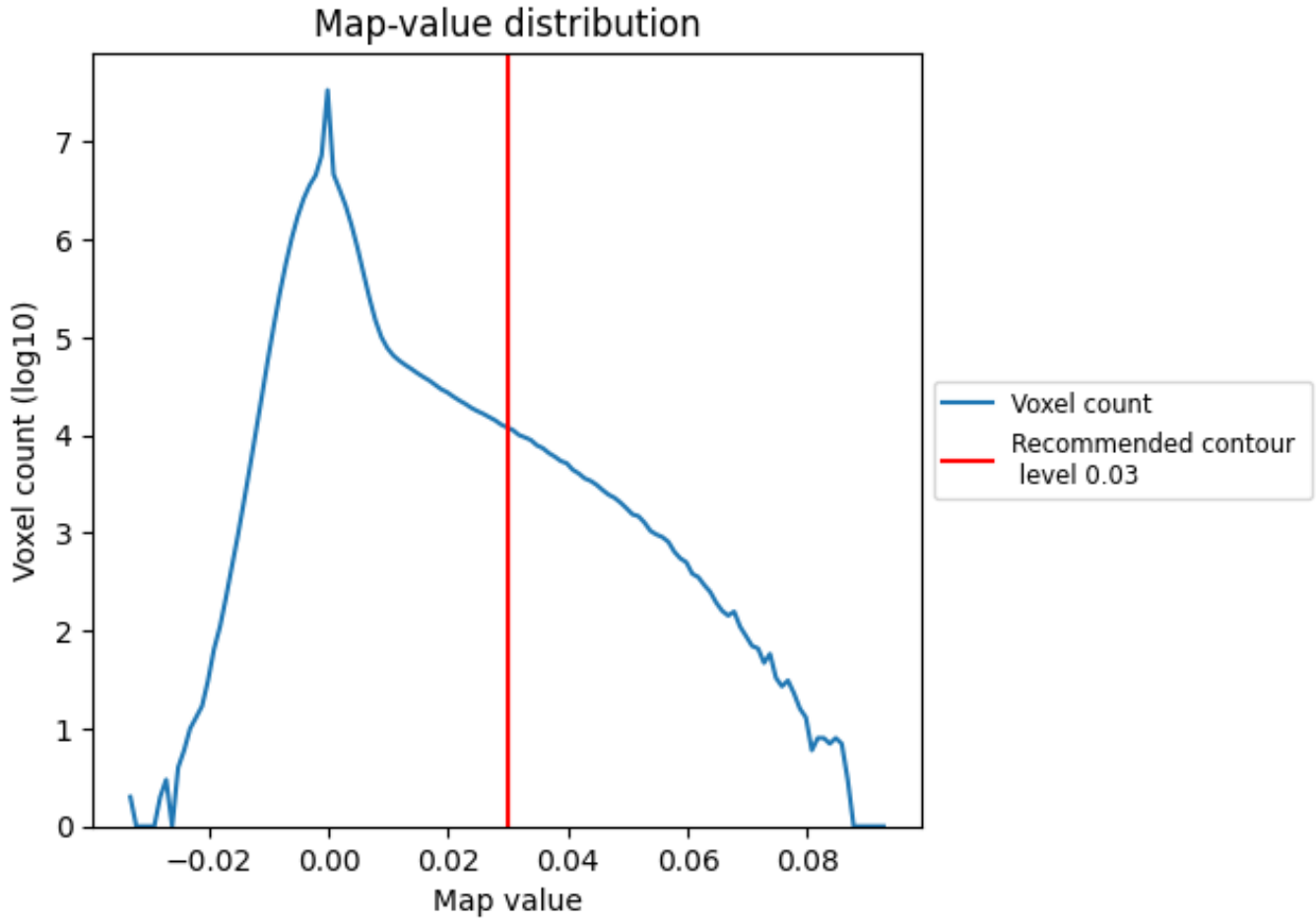
6.5 Mask visualisation (i)

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

7 Map analysis

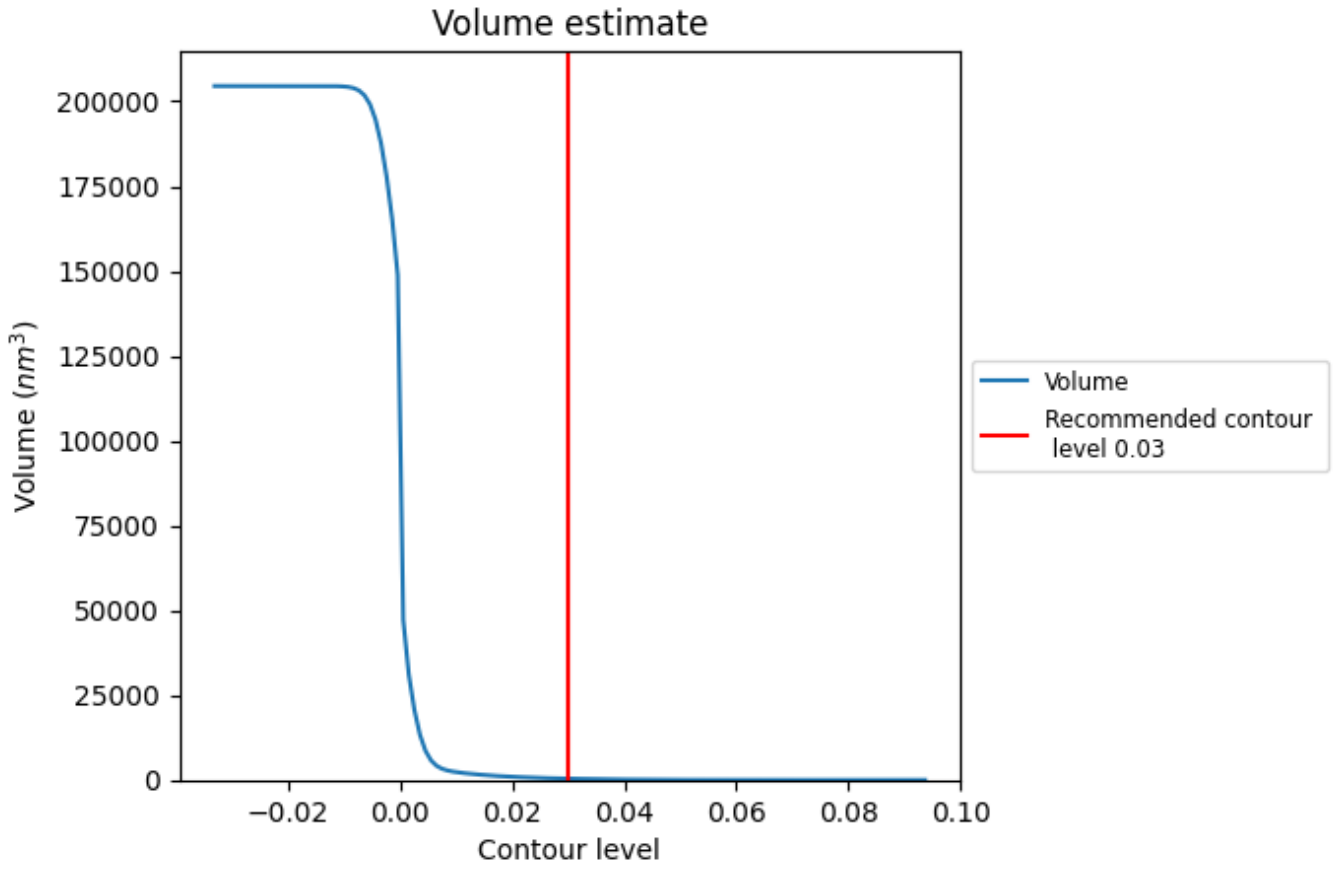
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



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

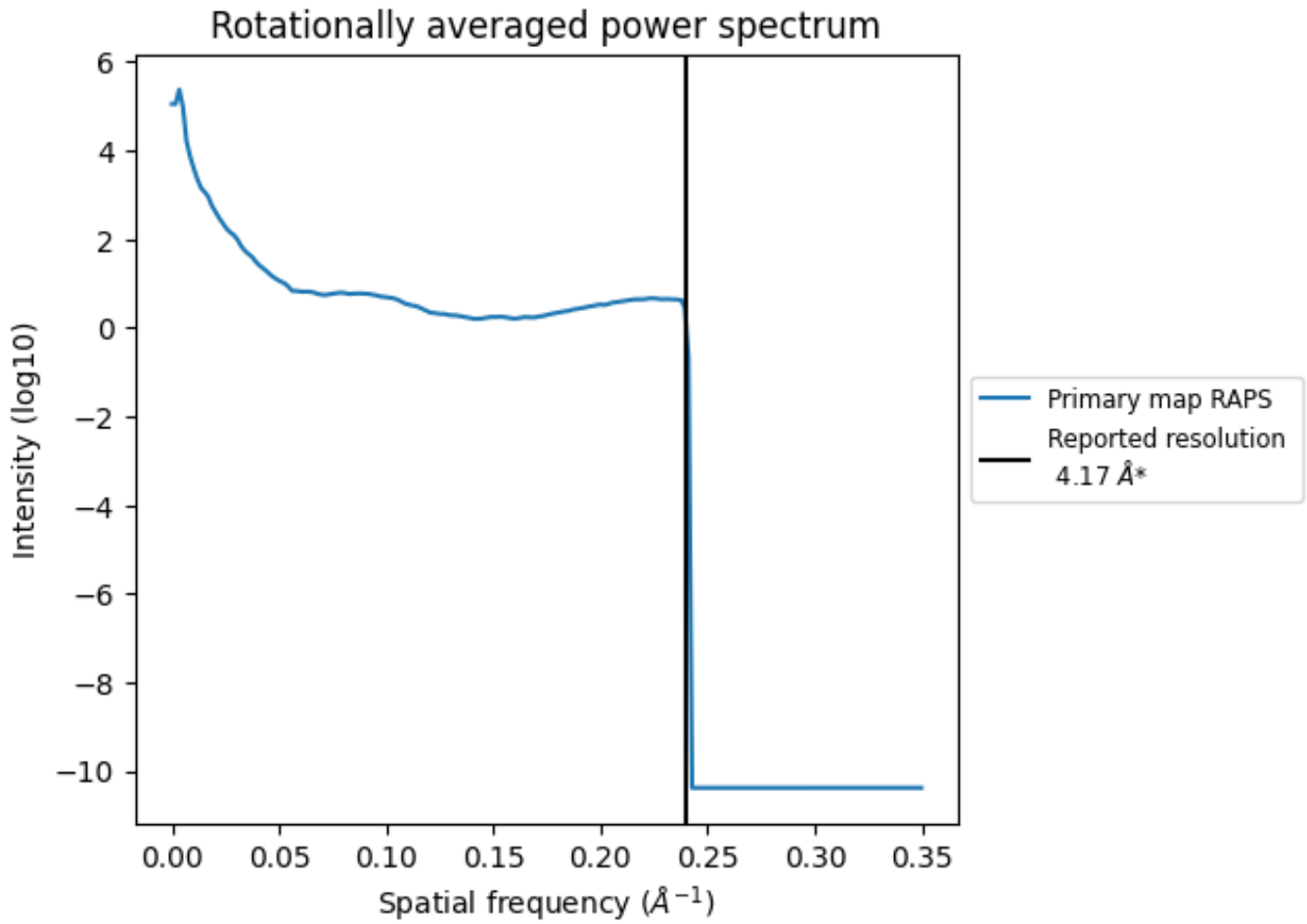
7.2 Volume estimate (i)



The volume at the recommended contour level is 380 nm^3; this corresponds to an approximate mass of 344 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 0.240 Å^{-1}

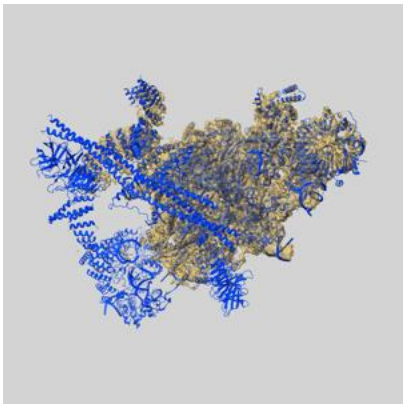
8 Fourier-Shell correlation

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

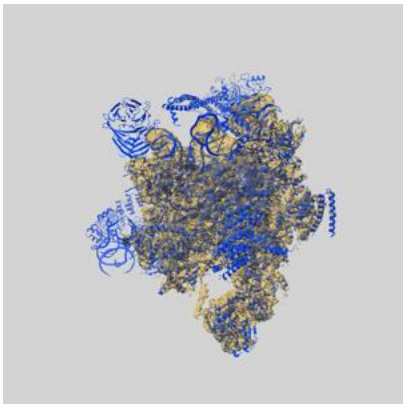
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-3541 and PDB model 5MQ0. Per-residue inclusion information can be found in section 3 on page 13.

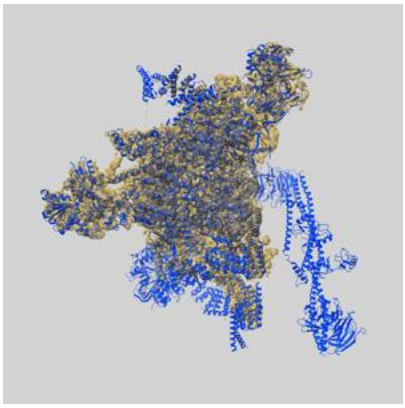
9.1 Map-model overlay



X



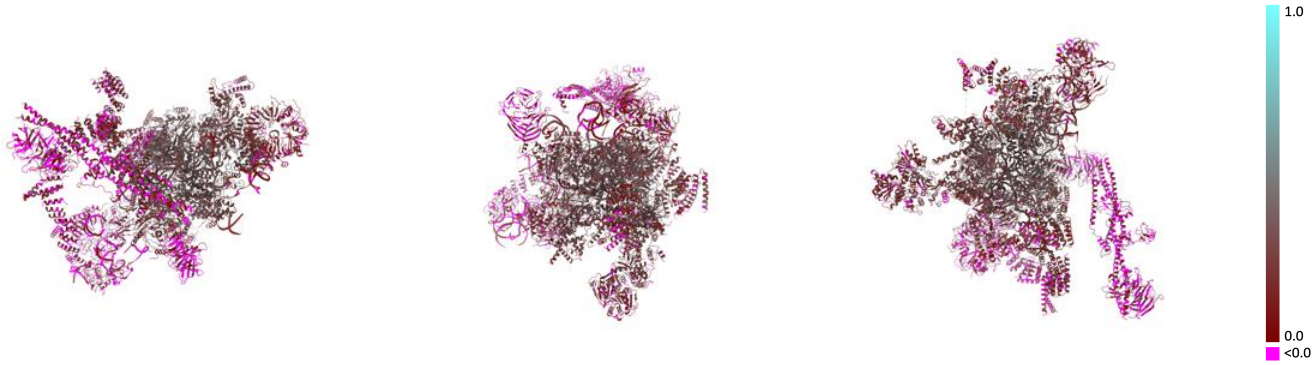
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.03 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.

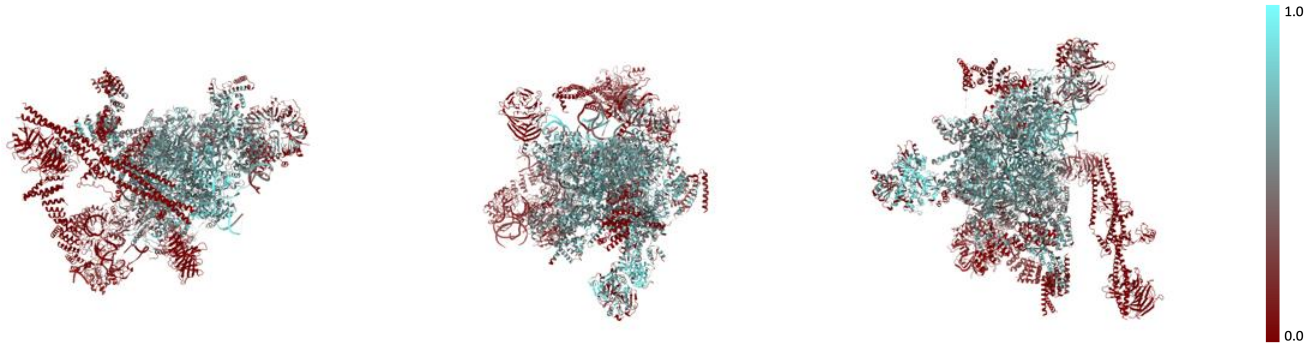
9.2 Q-score mapped to coordinate model (i)



X Y Z

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

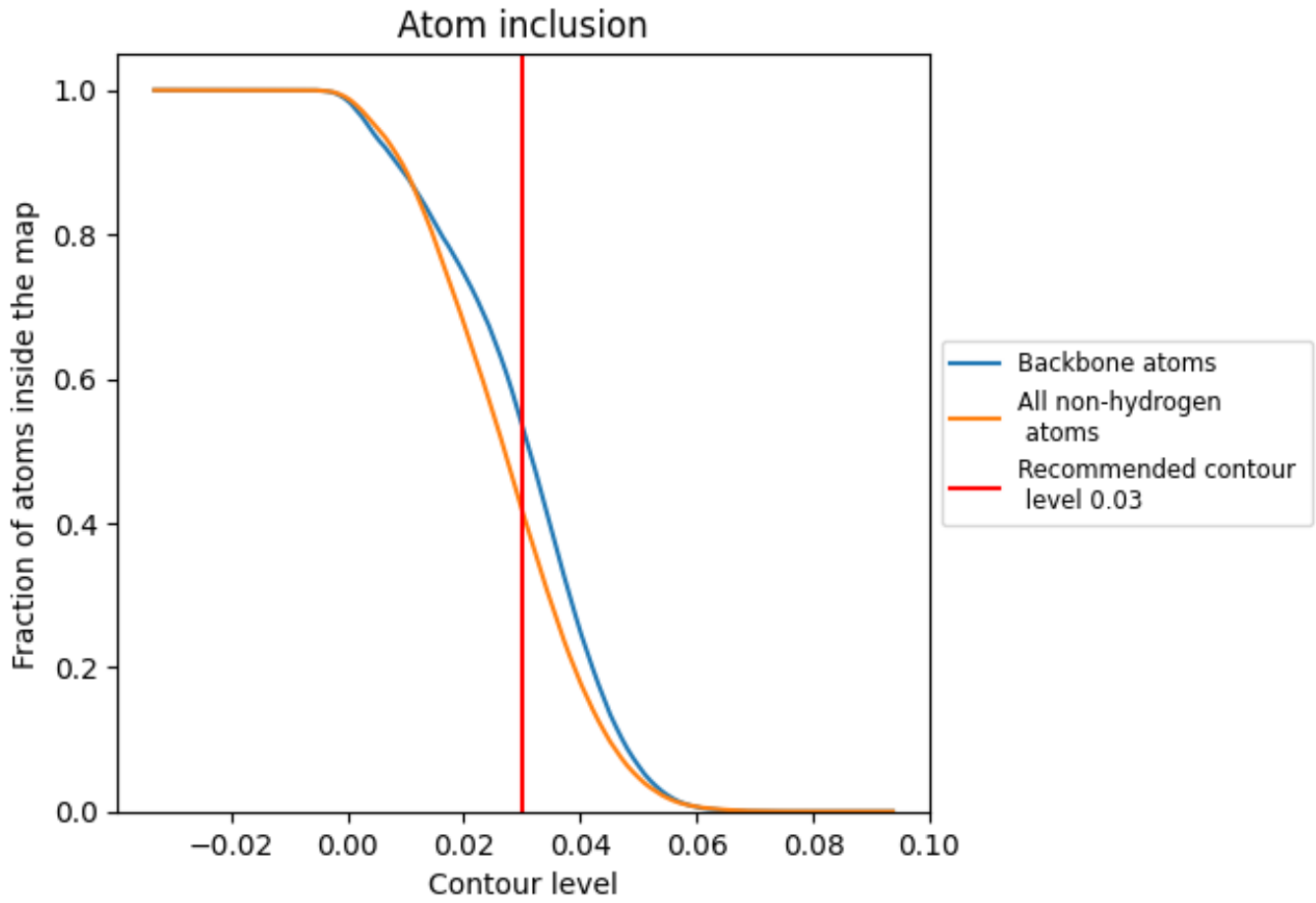
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.03).

9.4 Atom inclusion (i)



At the recommended contour level, 54% of all backbone atoms, 42% 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 (0.03) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.4181	0.2230
2	0.1847	0.0900
3	0.7667	0.3180
5	0.6966	0.2510
6	0.7634	0.3180
A	0.5867	0.3250
C	0.5685	0.3100
E	0.5954	0.2930
H	0.3106	0.2080
I	0.5476	0.2360
J	0.5828	0.3480
K	0.4444	0.2970
L	0.6596	0.3130
M	0.5572	0.2870
N	0.4918	0.2600
O	0.5108	0.2880
P	0.5000	0.3400
R	0.2911	0.2440
S	0.4309	0.2260
T	0.2502	0.1360
V	0.5412	0.1740
W	0.0000	0.0460
X	0.4822	0.2650
Y	0.0000	0.0360
a	0.4137	0.2210
b	0.3809	0.2090
c	0.4484	0.2410
d	0.3900	0.2450
e	0.2098	0.1450
f	0.2989	0.1120
g	0.2687	0.2060
h	0.2972	0.1290
j	0.2224	0.1380
k	0.0016	0.0410
l	0.0016	0.0350

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Chain	Atom inclusion	Q-score
m	0.0014	0.0390
n	0.0032	0.0710
o	0.3894	0.2400
p	0.0000	0.0120
q	0.0018	0.0290
r	0.0000	0.0590
s	0.0000	0.0560
t	0.0000	-0.0010
u	0.0000	0.0210
v	0.0000	-0.0160
w	0.0000	-0.0030
y	0.4940	0.2550