wwPDB EM Validation Summary Report

Nov 19, 2022 – 01:41 PM EST

PDB ID	:	3JCR
EMDB ID	:	EMD-6581
Title	:	3D structure determination of the human*U4/U6.U5* tri-snRNP complex
Authors	:	Agafonov, D.E.; Kastner, B.; Dybkov, O.; Hofele, R.V.; Liu, W.T.; Urlaub, H.; Luhrmann, R.; Stark, H.
Deposited on	:	2016-01-21
Resolution	:	7.00 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:

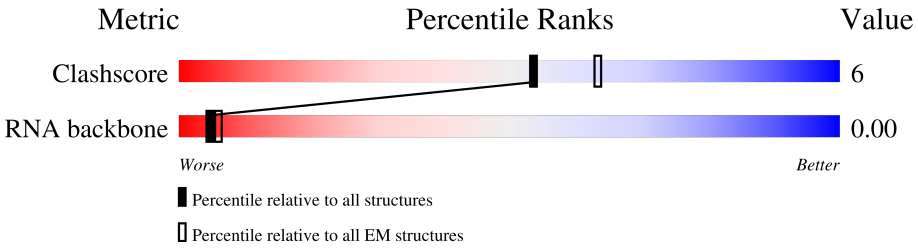
EMDB validation analysis	:	0.0.1.dev43
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.9
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.31.3

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 7.00 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
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	G	941	8% 43% · 56%
2	D	357	78% 84% · 15%
3	C	2136	17% 88% 12%
4	E	142	40% 94% · 5%
5	A	2335	18% 94% · 5%
6	F	820	41% 52% · 47%
7	B	972	12% 86% 13%
8	O	240	15% 37% 63%
8	o	240	22% 37% 63%

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Mol	Chain	Length	Quality of chain
9	P	119	29% 78% 22%
9	p	119	61% 79% 21%
10	Q	118	25% 75% 25%
10	q	118	60% 75% 25%
11	R	126	18% 70% 30%
11	r	126	38% 70% 30%
12	S	92	36% 85% 15%
12	s	92	59% 85% 15%
13	T	86	34% 85% 15%
13	t	86	80% 97%
14	U	76	34% 96%
14	u	76	41% 96%
15	8	96	66% 73% 27%
16	6	80	81% 88% 12%
17	5	91	82% 84% 16%
18	4	139	55% 58% 42%
19	3	102	75% 81% 19%
20	2	95	94% 95% 5%
21	7	103	74% 77% 23%
22	K	683	12% 18% 81%
23	L	521	21% 58% 41%
24	J	499	22% 46% 52%
25	I	128	23% 95%
26	V	565	18% 75% 24%
27	M	145	47% 71% 29%

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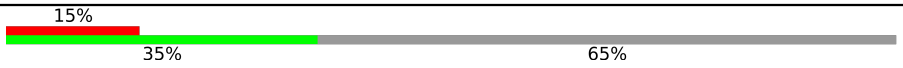
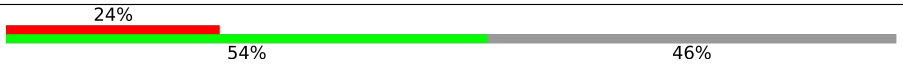
Mol	Chain	Length	Quality of chain
28	N	106	
29	H	116	

2 Entry composition (i)

There are 29 unique types of molecules in this entry. The entry contains 9403 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called hPrp6.

Mol	Chain	Residues	Atoms	AltConf	Trace
1	G	418	Total C 418 418	0	418

- Molecule 2 is a protein called U5-40K.

Mol	Chain	Residues	Atoms	AltConf	Trace
2	D	302	Total C 302 302	0	302

- Molecule 3 is a protein called hBrr2.

Mol	Chain	Residues	Atoms	AltConf	Trace
3	C	1885	Total C 1885 1885	0	1885

- Molecule 4 is a protein called hDim1.

Mol	Chain	Residues	Atoms	AltConf	Trace
4	E	135	Total C 135 135	0	135

- Molecule 5 is a protein called hPrp8.

Mol	Chain	Residues	Atoms	AltConf	Trace
5	A	2222	Total C 2222 2222	0	2222

- Molecule 6 is a protein called hPrp28.

Mol	Chain	Residues	Atoms	AltConf	Trace
6	F	435	Total C 435 435	0	435

- Molecule 7 is a protein called hSnu114.

Mol	Chain	Residues	Atoms	AltConf	Trace
7	B	844	Total C 844 844	0	844

- Molecule 8 is a protein called SmB.

Mol	Chain	Residues	Atoms	AltConf	Trace
8	O	89	Total C 89 89	0	89
8	o	89	Total C 89 89	0	89

- Molecule 9 is a protein called SmD1.

Mol	Chain	Residues	Atoms	AltConf	Trace
9	P	93	Total C 93 93	0	93
9	p	94	Total C 94 94	0	94

- Molecule 10 is a protein called SmD2.

Mol	Chain	Residues	Atoms	AltConf	Trace
10	Q	89	Total C 89 89	0	89
10	q	89	Total C 89 89	0	89

- Molecule 11 is a protein called SmD3.

Mol	Chain	Residues	Atoms	AltConf	Trace
11	R	88	Total C 88 88	0	88
11	r	88	Total C 88 88	0	88

- Molecule 12 is a protein called SmE.

Mol	Chain	Residues	Atoms	AltConf	Trace
12	S	78	Total C 78 78	0	78

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Mol	Chain	Residues	Atoms	AltConf	Trace
12	s	78	Total C 78 78	0	78

- Molecule 13 is a protein called SmF.

Mol	Chain	Residues	Atoms	AltConf	Trace
13	T	73	Total C 73 73	0	73
13	t	83	Total C 83 83	0	83

- Molecule 14 is a protein called SmG.

Mol	Chain	Residues	Atoms	AltConf	Trace
14	U	73	Total C 73 73	0	73
14	u	73	Total C 73 73	0	73

- Molecule 15 is a protein called LSm8.

Mol	Chain	Residues	Atoms	AltConf	Trace
15	8	70	Total C 70 70	0	70

- Molecule 16 is a protein called LSm6.

Mol	Chain	Residues	Atoms	AltConf	Trace
16	6	70	Total C 70 70	0	70

- Molecule 17 is a protein called LSm5.

Mol	Chain	Residues	Atoms	AltConf	Trace
17	5	76	Total C 76 76	0	76

- Molecule 18 is a protein called LSm4.

Mol	Chain	Residues	Atoms	AltConf	Trace
18	4	80	Total C 80 80	0	80

- Molecule 19 is a protein called LSm3.

Mol	Chain	Residues	Atoms	AltConf	Trace
19	3	83	Total C 83 83	0	83

- Molecule 20 is a protein called LSm2.

Mol	Chain	Residues	Atoms	AltConf	Trace
20	2	90	Total C 90 90	0	90

- Molecule 21 is a protein called LSm7.

Mol	Chain	Residues	Atoms	AltConf	Trace
21	7	79	Total C 79 79	0	79

- Molecule 22 is a protein called hPrp3.

Mol	Chain	Residues	Atoms	AltConf	Trace
22	K	131	Total C 131 131	0	131

- Molecule 23 is a protein called hPrp4.

Mol	Chain	Residues	Atoms	AltConf	Trace
23	L	307	Total C 307 307	0	307

- Molecule 24 is a protein called hPrp31.

Mol	Chain	Residues	Atoms	AltConf	Trace
24	J	239	Total C 239 239	0	239

- Molecule 25 is a protein called hSnu13.

Mol	Chain	Residues	Atoms	AltConf	Trace
25	I	126	Total C 126 126	0	126

- Molecule 26 is a protein called hSad1.

Mol	Chain	Residues	Atoms	AltConf	Trace
26	V	431	Total C 431 431	0	431

- Molecule 27 is a RNA chain called U4 snRNA.

Mol	Chain	Residues	Atoms	AltConf	Trace
27	M	103	Total P 103 103	0	103

- Molecule 28 is a RNA chain called U6 snRNA.

Mol	Chain	Residues	Atoms	AltConf	Trace
28	N	37	Total P 37 37	0	37

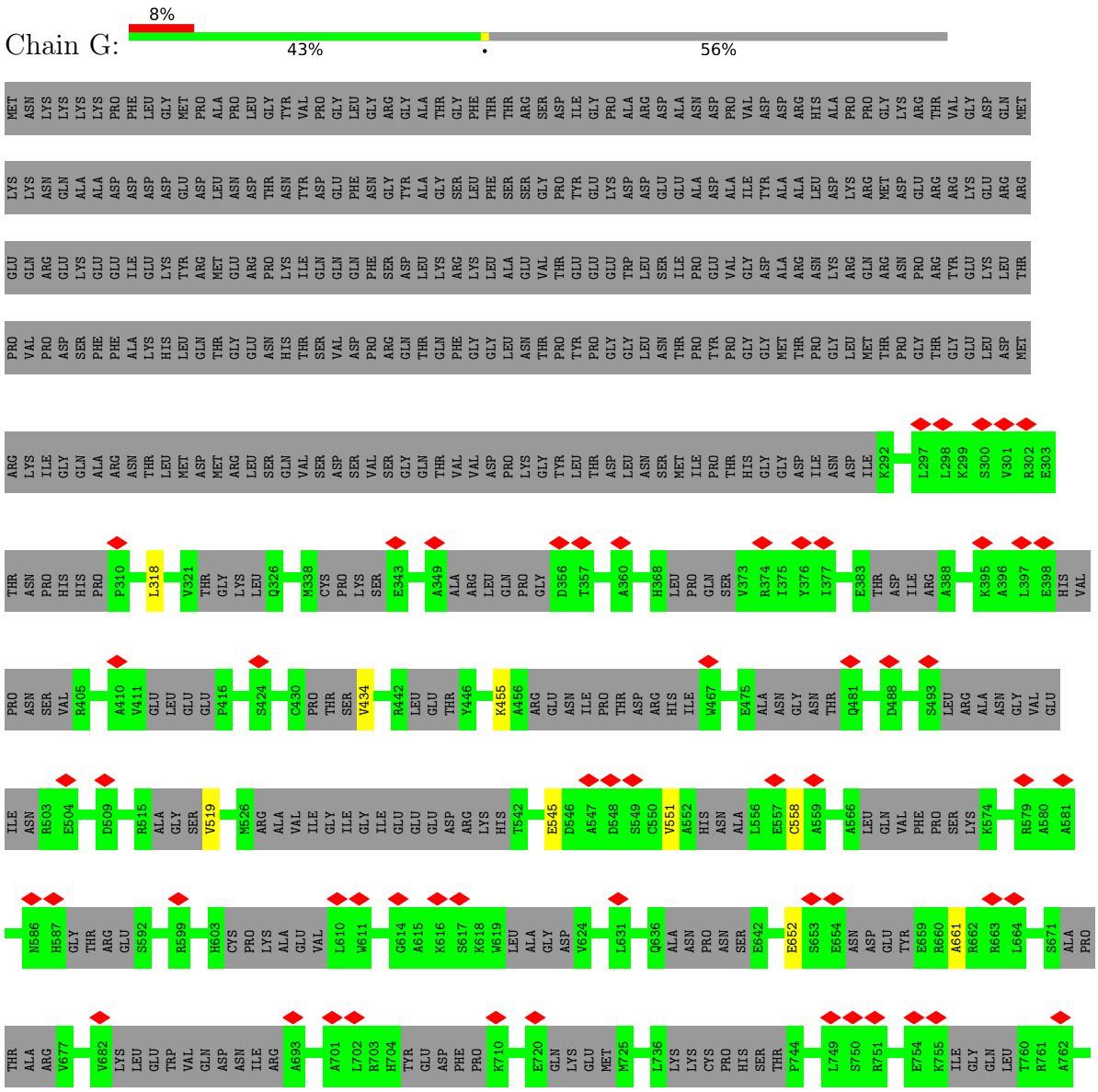
- Molecule 29 is a RNA chain called U5 snRNA.

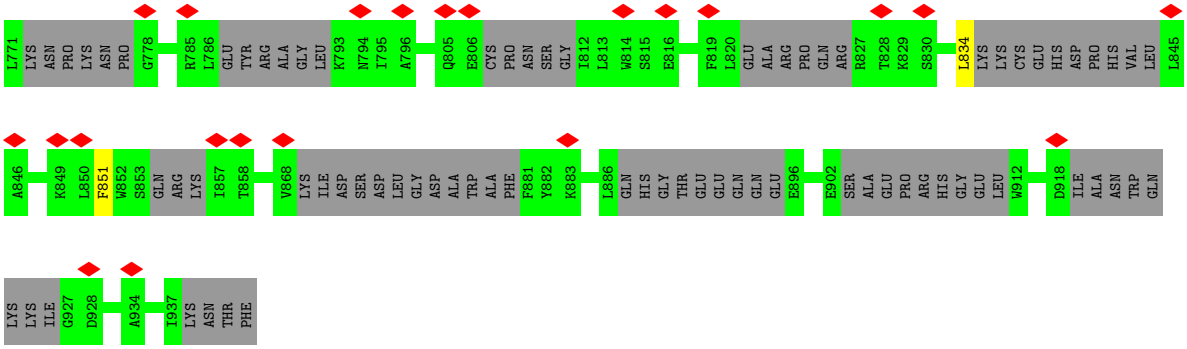
Mol	Chain	Residues	Atoms	AltConf	Trace
29	H	63	Total P 63 63	0	63

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.

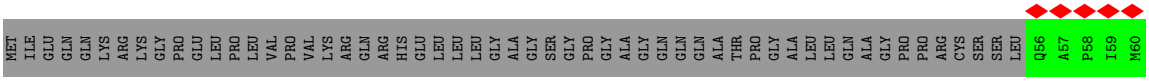
- Molecule 1: hPrp6

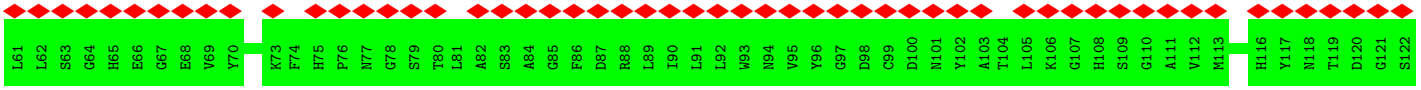


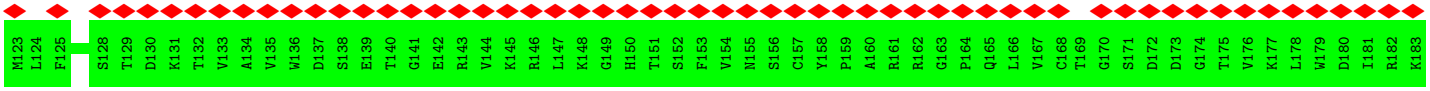


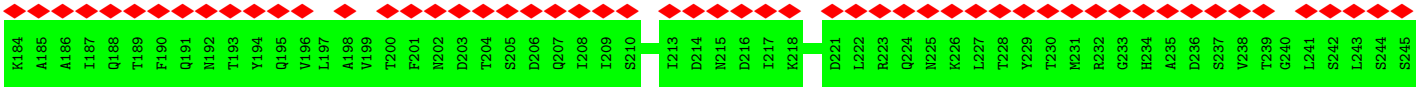
• Molecule 2: U5-40K

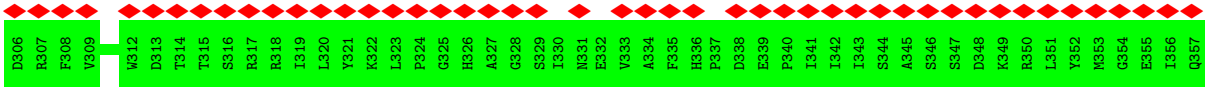
Chain D:





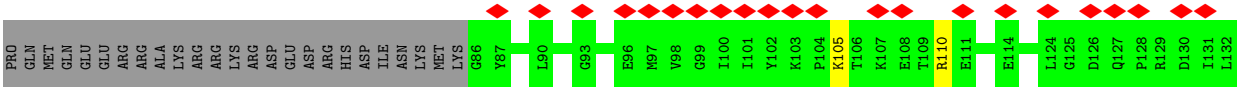


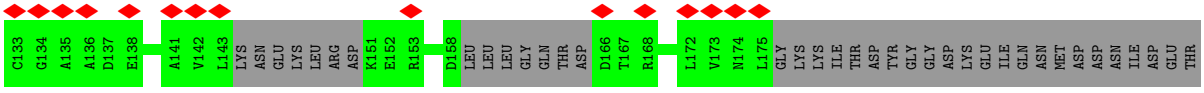


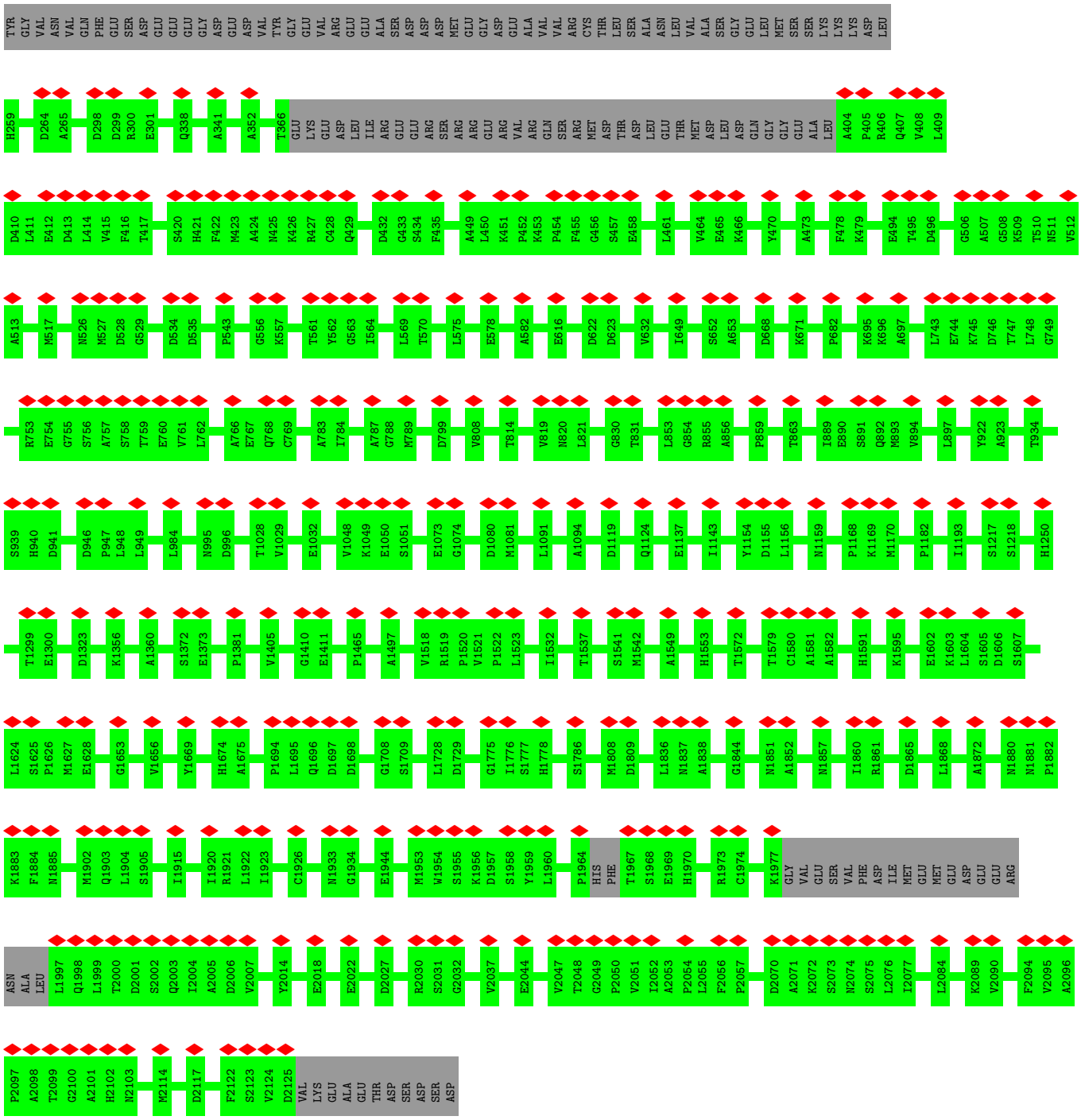


• Molecule 3: hBrr2

Chain C:

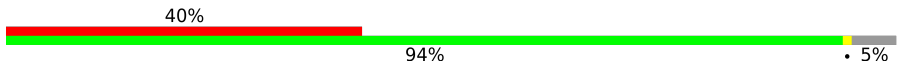


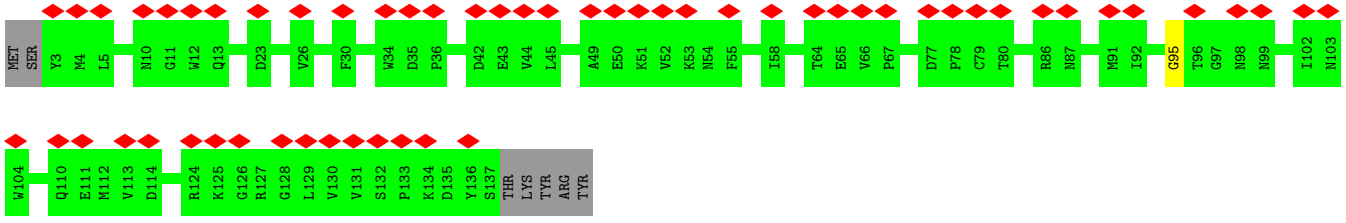




- Molecule 4: hDim1

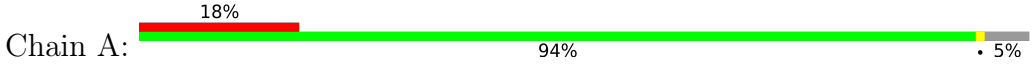
Chain E:

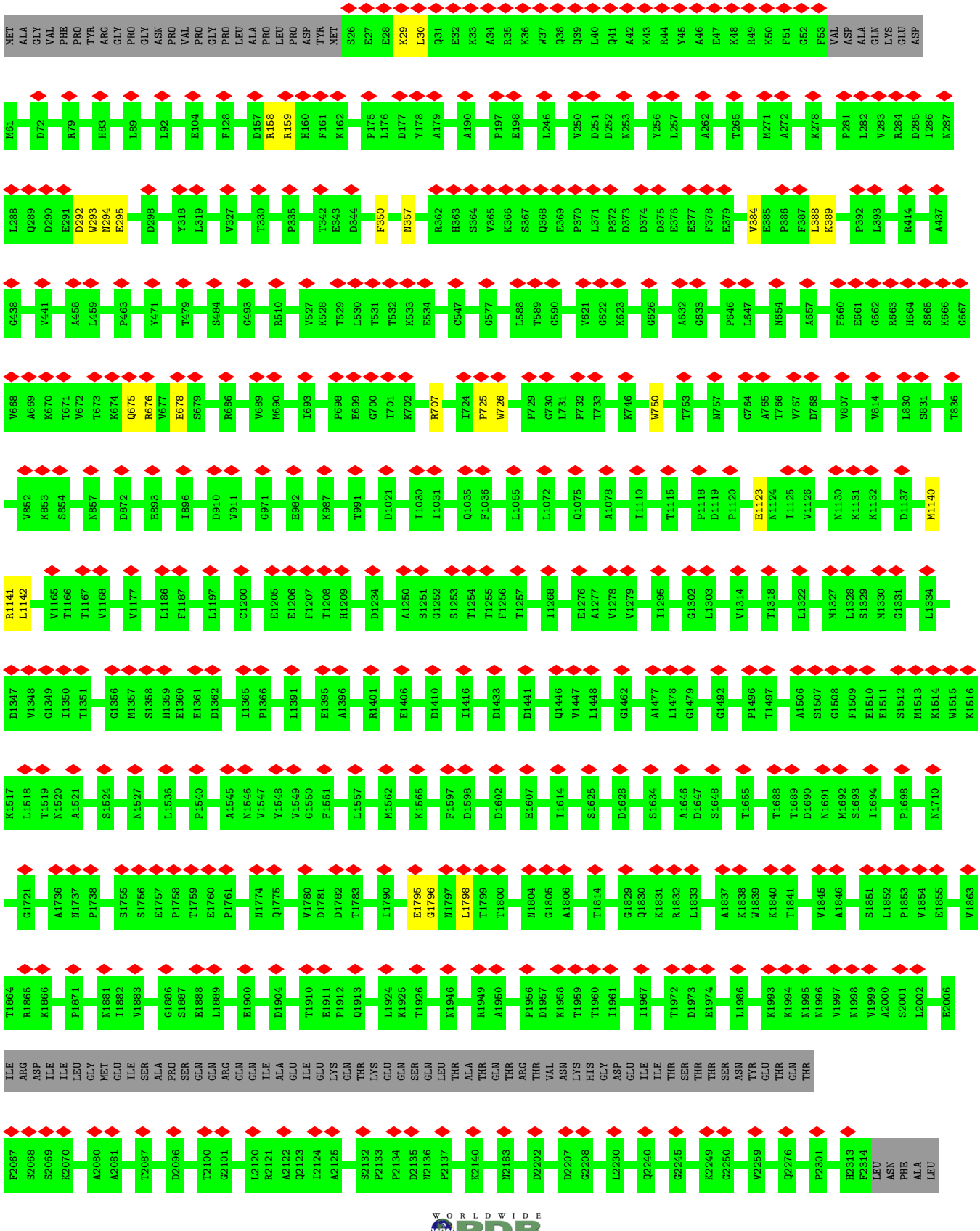




• Molecule 5: hPrp8

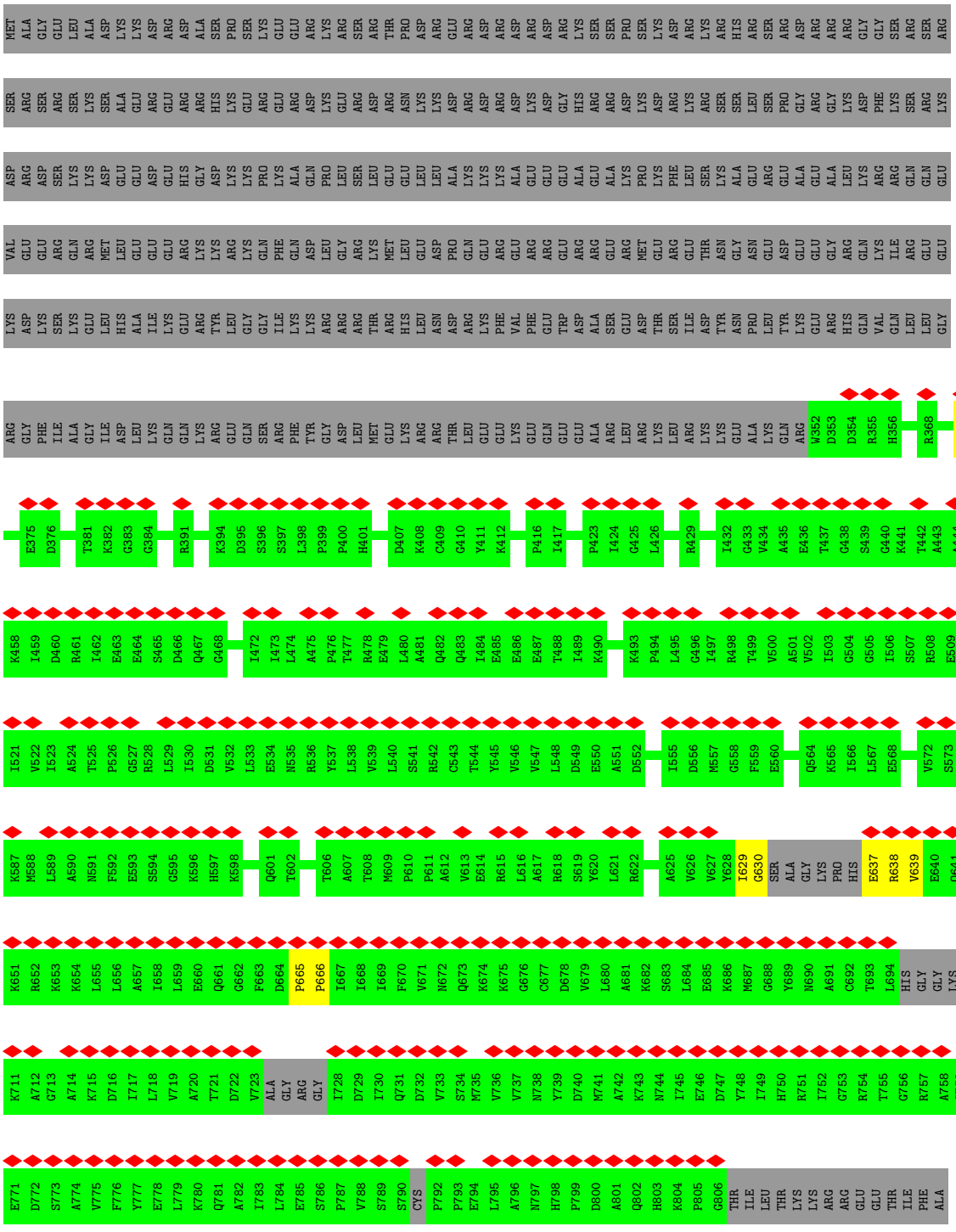
Chain A:





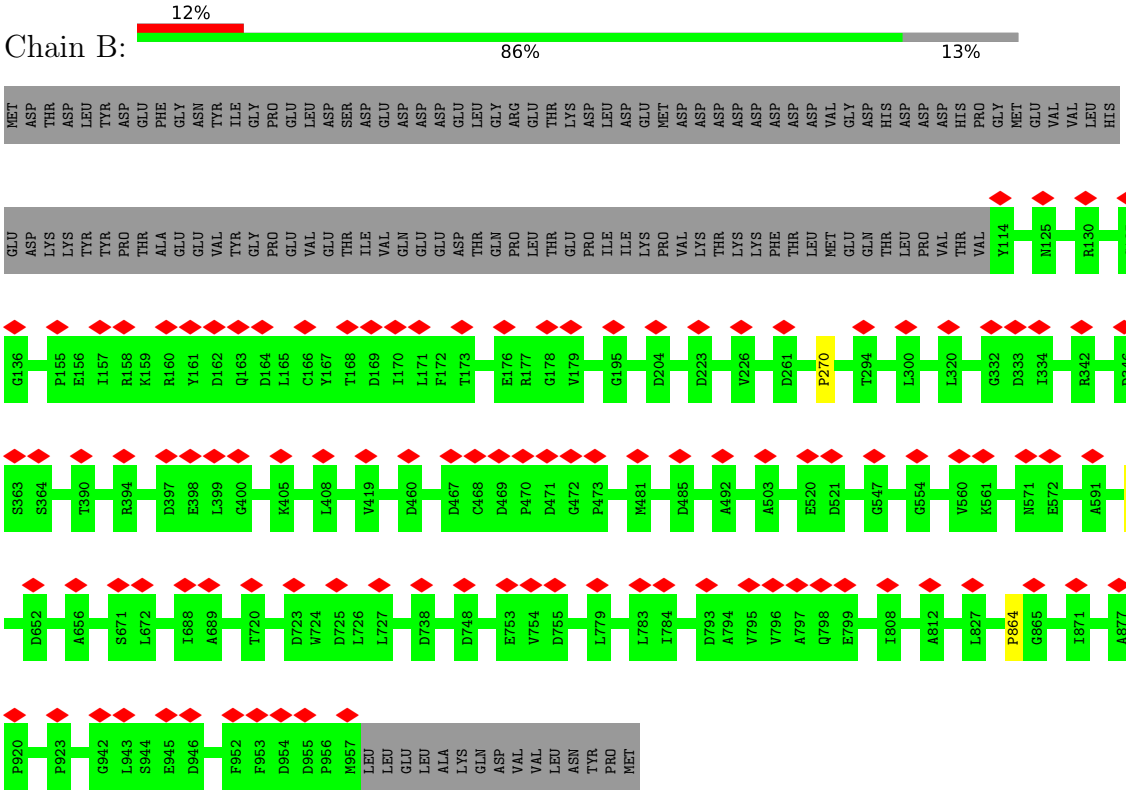
- Molecule 6: hPrp28

Chain F:



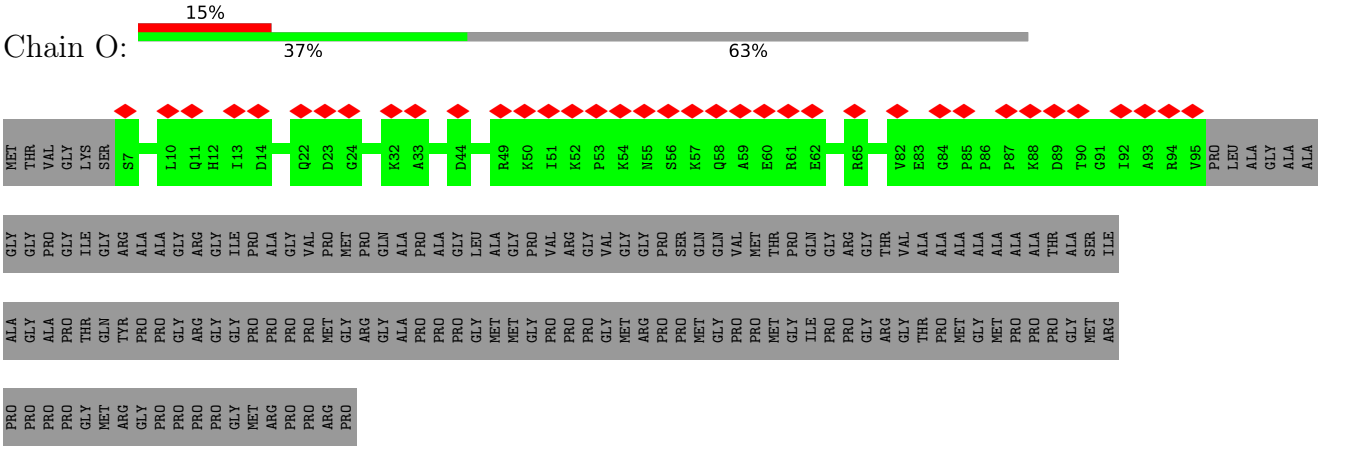
- Molecule 7: hSnu114

Chain B:



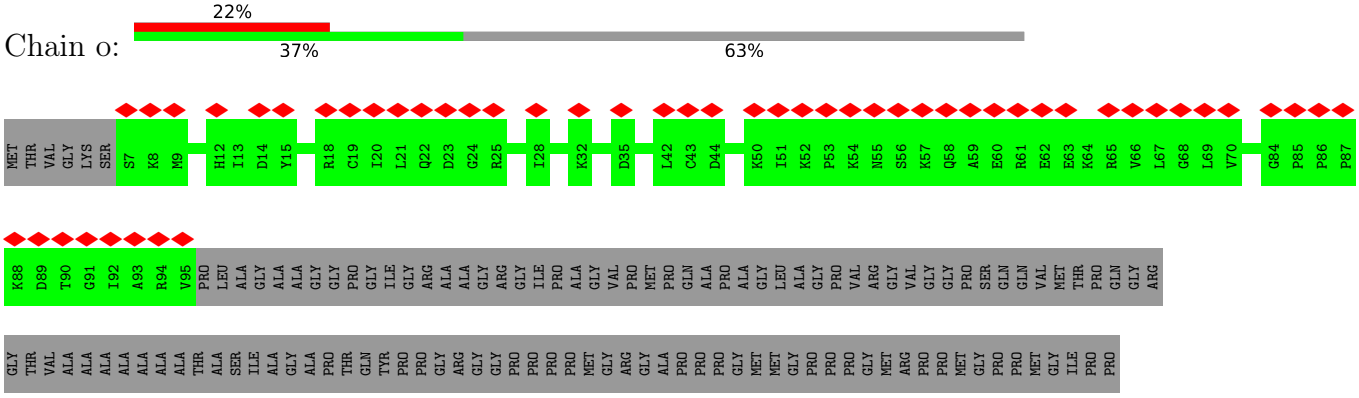
• Molecule 8: SmB

Chain O:



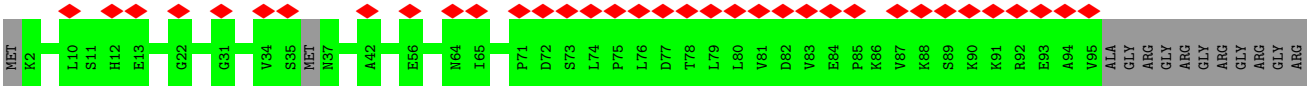
• Molecule 8: SmB

Chain o:



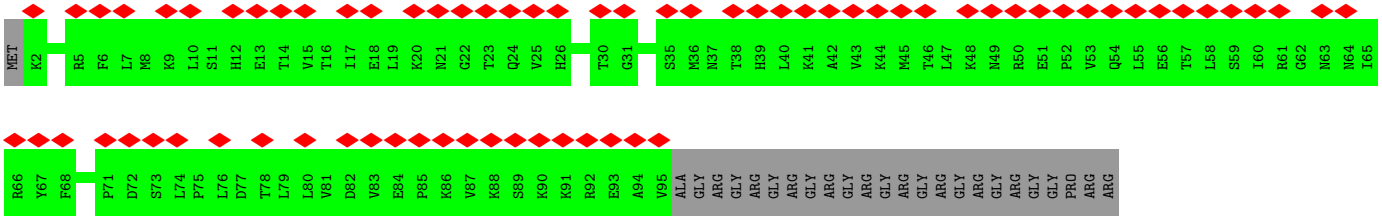
• Molecule 9: SmD1

Chain P:



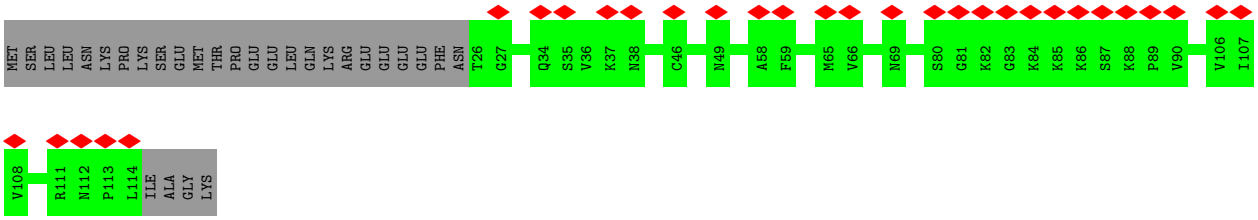
• Molecule 9: SmD1

Chain p:



• Molecule 10: SmD2

Chain Q:

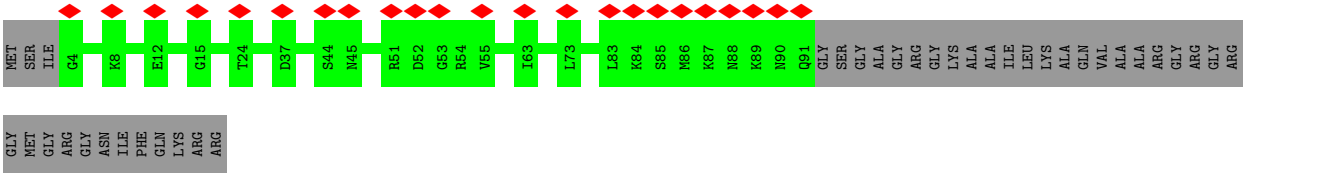


• Molecule 10: SmD2

Chain q:

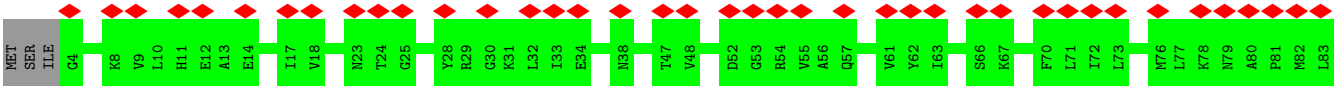
• Molecule 11: SmD3

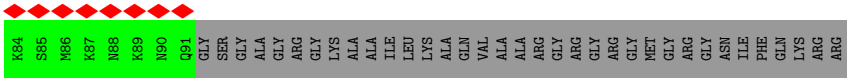
Chain R:



• Molecule 11: SmD3

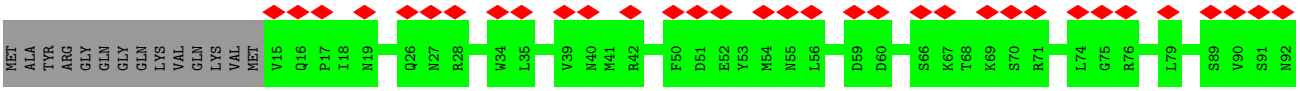
Chain r:





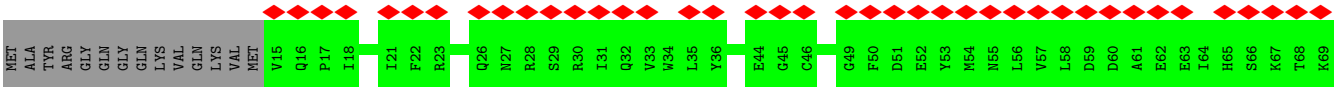
• Molecule 12: SmE

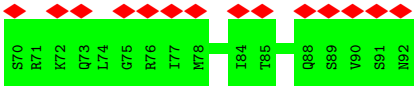
Chain S:



• Molecule 12: SmE

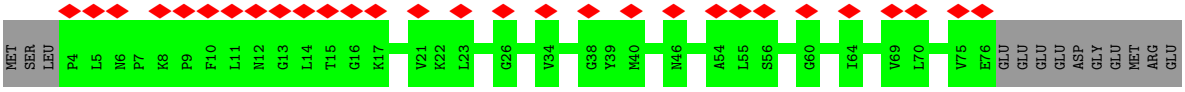
Chain s:





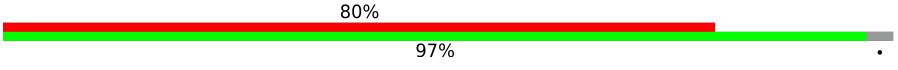
• Molecule 13: SmF

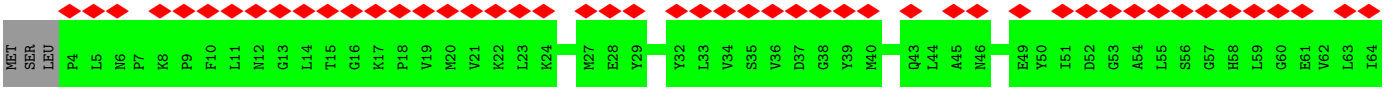
Chain T:

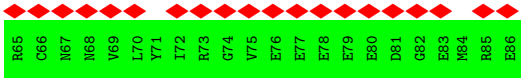


• Molecule 13: SmF

Chain t:

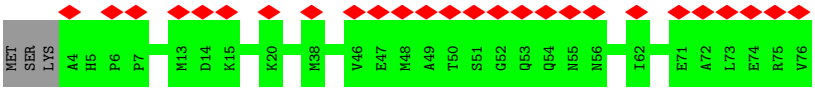






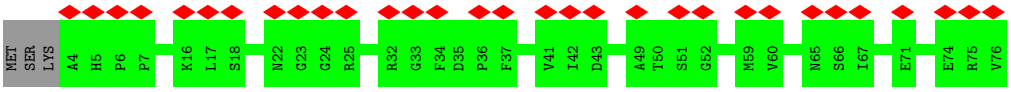
• Molecule 14: SmG

Chain U:



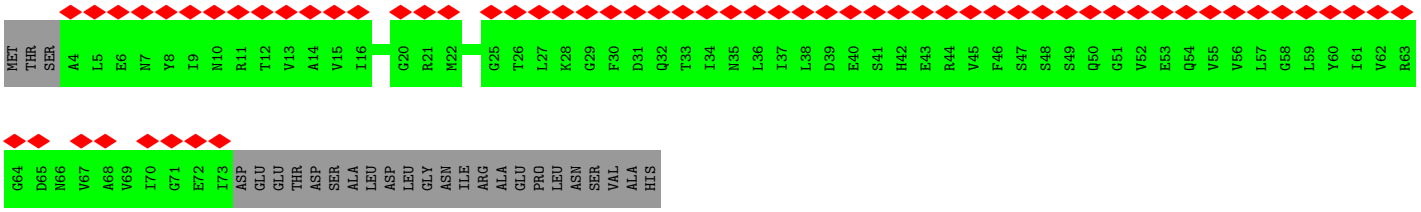
• Molecule 14: SmG

Chain u:



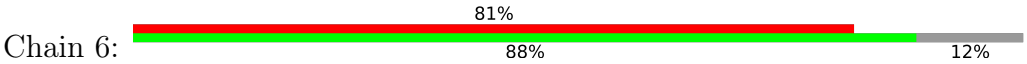
• Molecule 15: LSm8

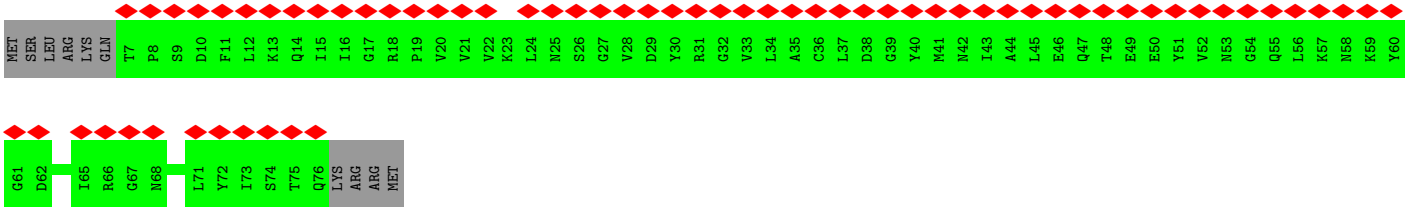
Chain 8:



• Molecule 16: LSm6

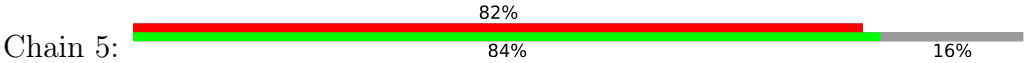
Chain 6:

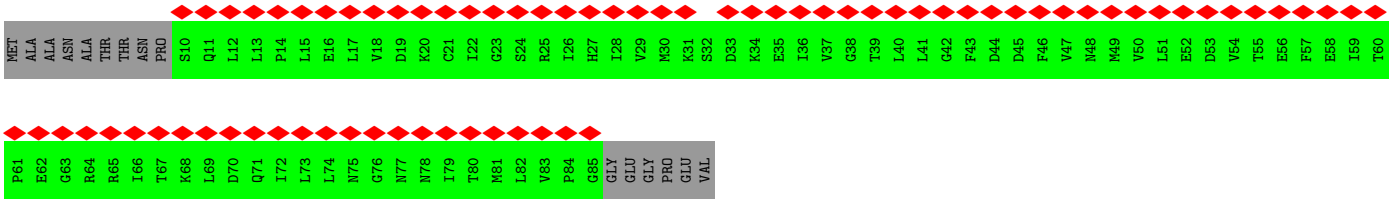




• Molecule 17: LSm5

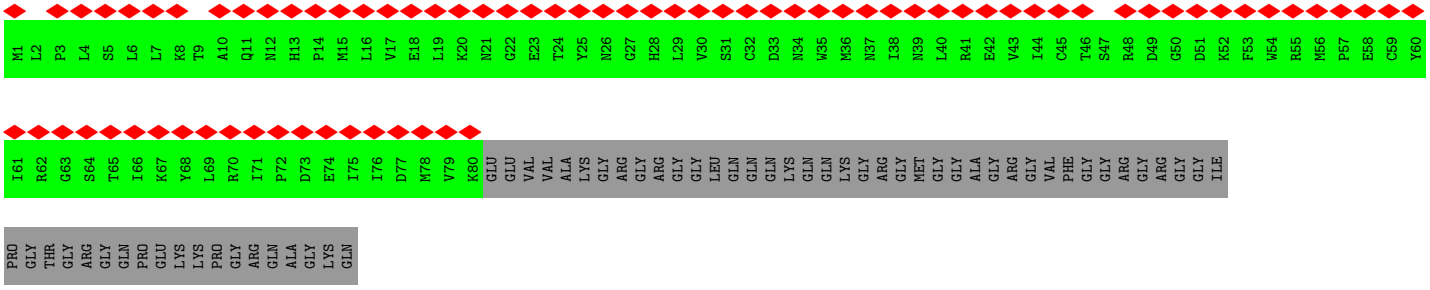
Chain 5:





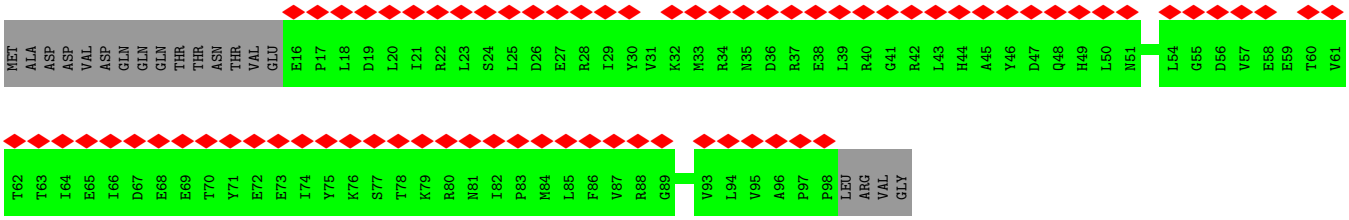
• Molecule 18: LSm4

Chain 4:



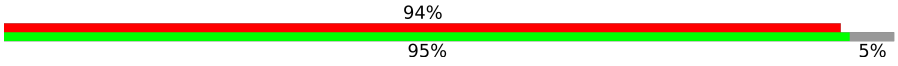
• Molecule 19: LSm3

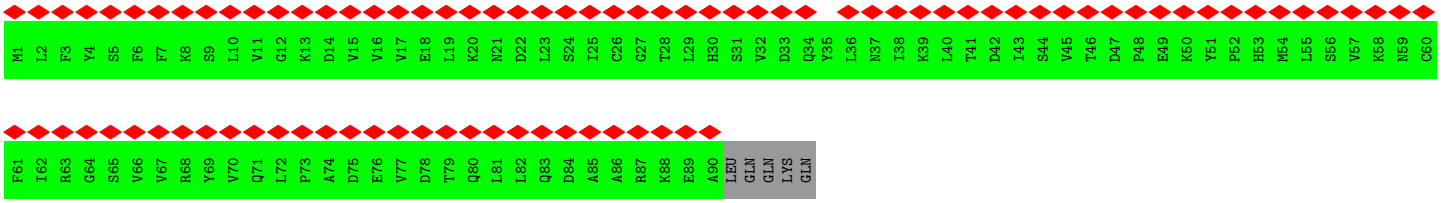
Chain 3:



• Molecule 20: LSm2

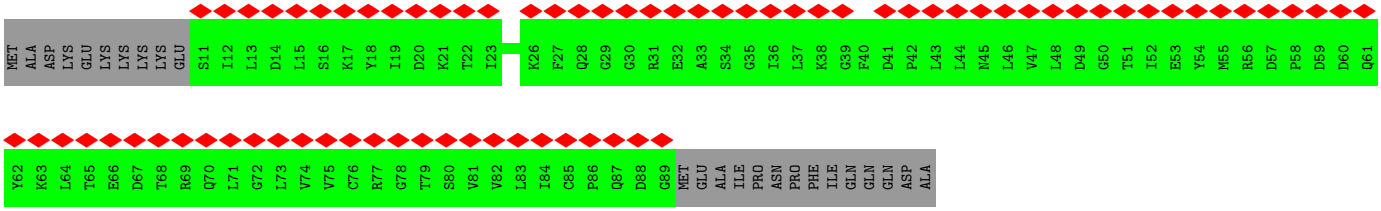
Chain 2:





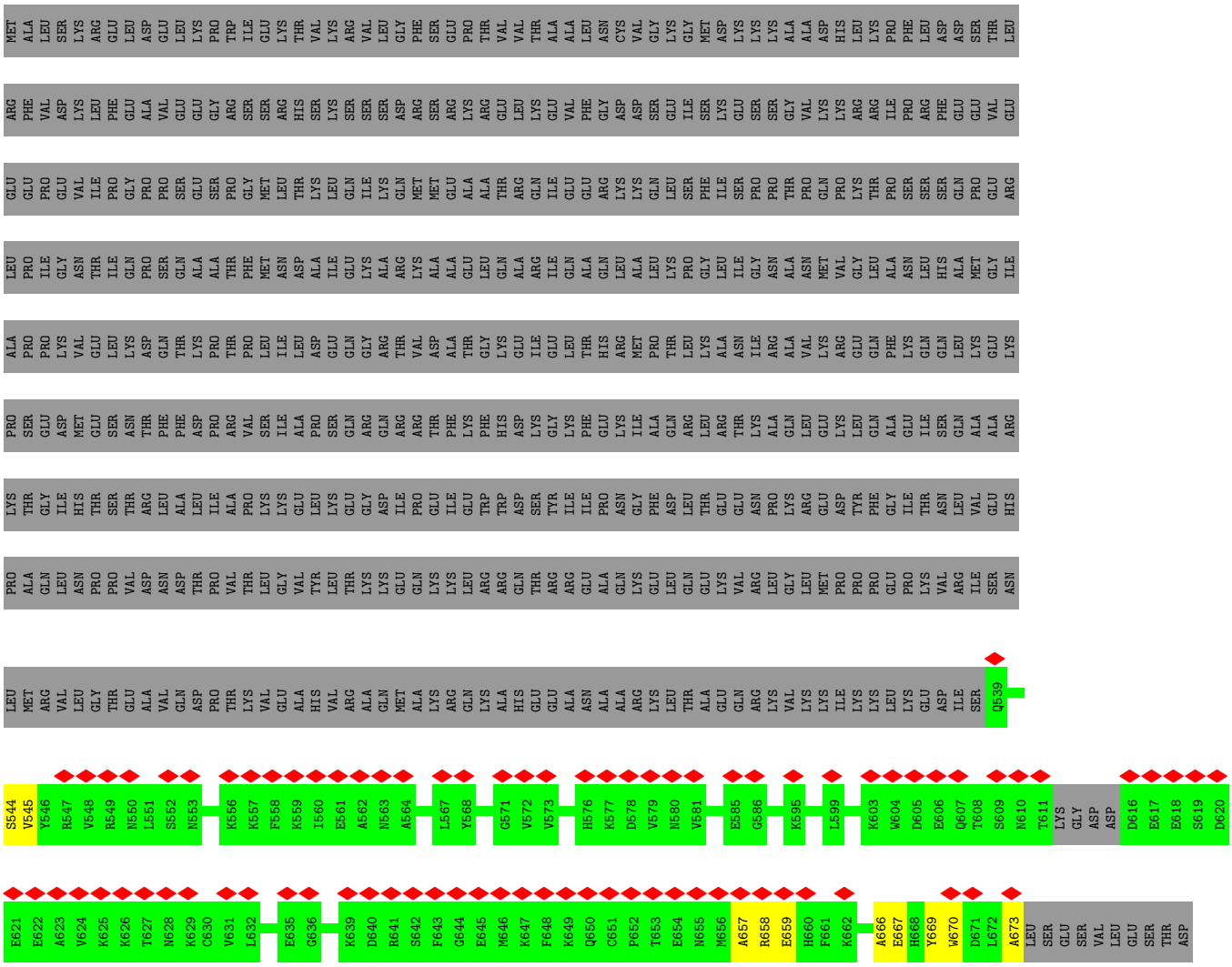
• Molecule 21: LSm7

Chain 7:

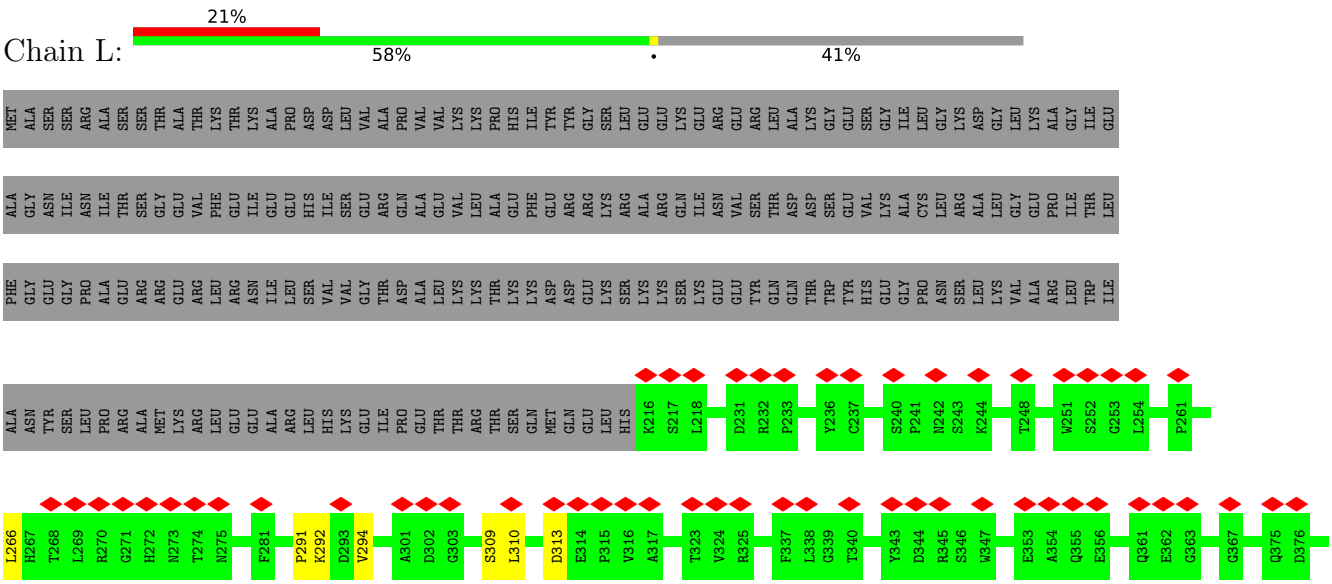


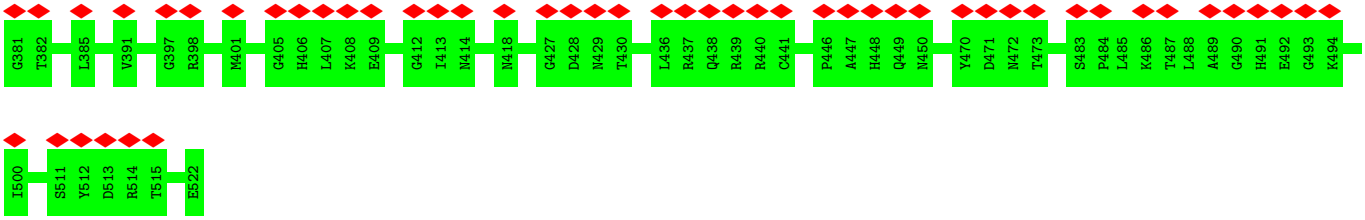
• Molecule 22: hPrp3

Chain K:



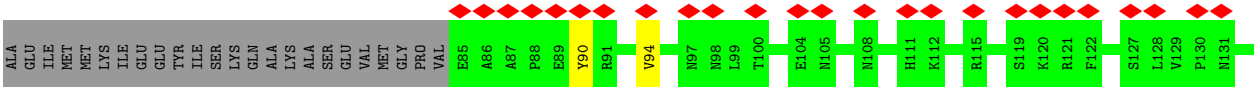
• Molecule 23: hPrp4

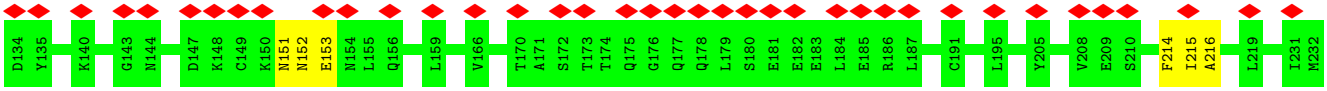


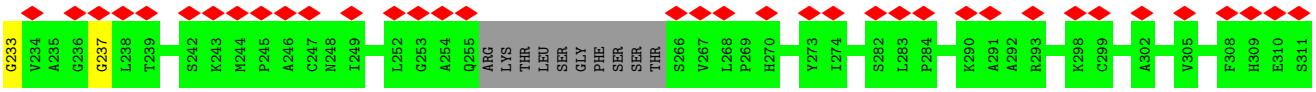


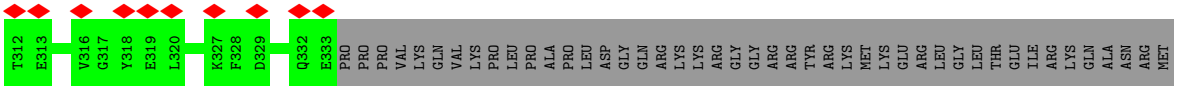
• Molecule 24: hPrp31

Chain J:



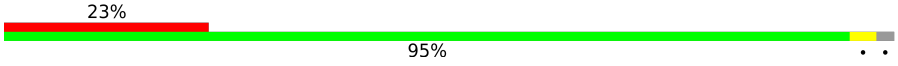


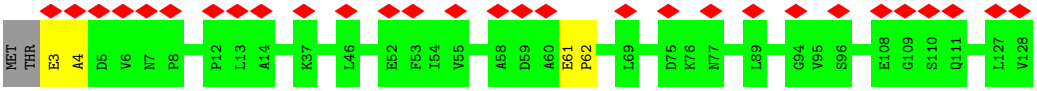




• Molecule 25: hSnu13

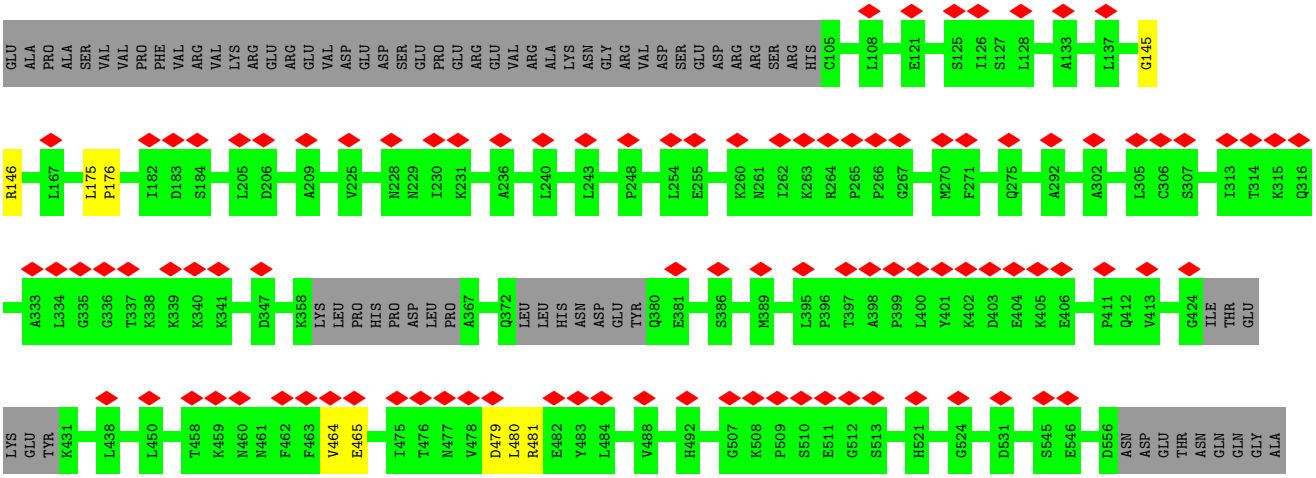
Chain I:





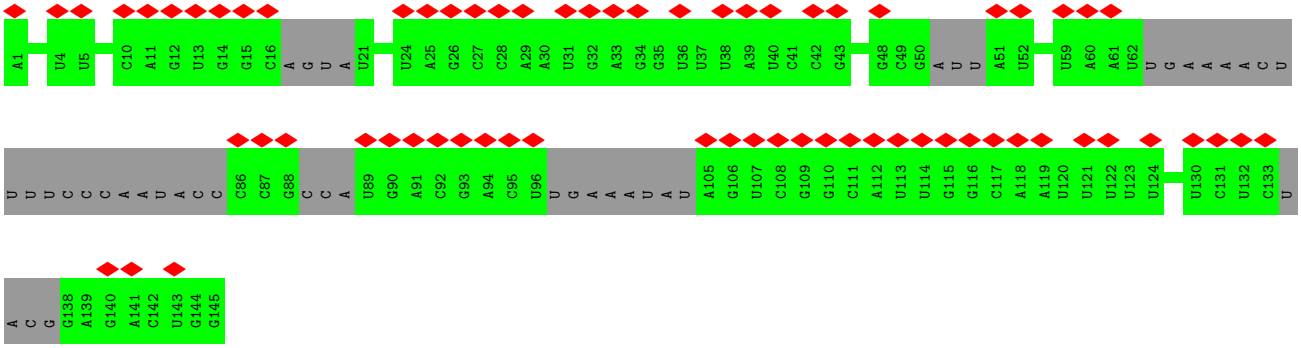
• Molecule 26: hSad1

Chain V:



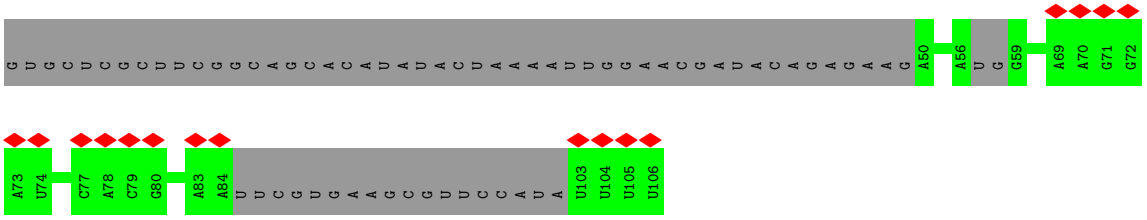
• Molecule 27: U4 snRNA

Chain M:



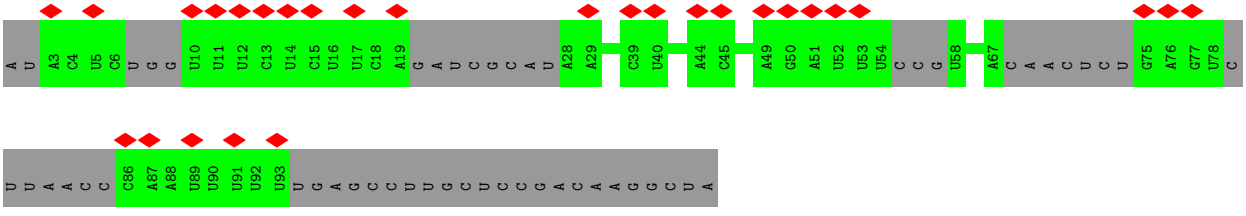
• Molecule 28: U6 snRNA

Chain N:



• Molecule 29: U5 snRNA

Chain H:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	141109	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	Not provided	
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	45	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	5350	Depositor
Magnification	74000	Depositor
Image detector	FEI FALCON II (4k x 4k)	Depositor
Maximum map value	0.653	Depositor
Minimum map value	-0.382	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.027	Depositor
Recommended contour level	0.13	Depositor
Map size (Å)	440.0, 440.0, 440.0	wwPDB
Map dimensions	220, 220, 220	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	2.0, 2.0, 2.0	Depositor

5 Model quality

5.1 Standard geometry

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

There are no protein, RNA or DNA chains available to summarize Z scores of covalent bonds and angles.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	G	418	0	0	6	0
2	D	302	0	0	3	0
3	C	1885	0	0	1	0
4	E	135	0	0	1	0
5	A	2222	0	0	20	0
6	F	435	0	0	6	0
7	B	844	0	0	4	0
8	O	89	0	0	0	0
8	o	89	0	0	0	0
9	P	93	0	0	0	0
9	p	94	0	0	0	0
10	Q	89	0	0	0	0
10	q	89	0	0	0	0
11	R	88	0	0	0	0
11	r	88	0	0	0	0
12	S	78	0	0	0	0
12	s	78	0	0	0	0
13	T	73	0	0	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
13	t	83	0	0	0	0
14	U	73	0	0	0	0
14	u	73	0	0	0	0
15	8	70	0	0	0	0
16	6	70	0	0	0	0
17	5	76	0	0	0	0
18	4	80	0	0	0	0
19	3	83	0	0	0	0
20	2	90	0	0	0	0
21	7	79	0	0	0	0
22	K	131	0	0	10	0
23	L	307	0	0	10	0
24	J	239	0	0	7	0
25	I	126	0	0	2	0
26	V	431	0	0	6	0
27	M	103	0	0	0	0
28	N	37	0	0	0	0
29	H	63	0	0	0	0
All	All	9403	0	0	52	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 6.

The worst 5 of 52 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)
24:J:94:VAL:CA	24:J:233:GLY:CA	1.95	1.44
5:A:294:ASN:CA	5:A:1141:ARG:CA	1.96	1.43
4:E:95:GLY:CA	5:A:707:ARG:CA	1.95	1.42
22:K:669:TYR:CA	23:L:294:VAL:CA	1.98	1.39
24:J:215:ILE:CA	24:J:216:ALA:CA	2.03	1.36

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

There are no protein backbone outliers to report in this entry.

5.3.2 Protein sidechains (i)

There are no protein residues with a non-rotameric sidechain to report in this entry.

5.3.3 RNA (i)

Mol	Chain	Analysed	Backbone Outliers	Pucker Outliers
27	M	0/145	-	-
28	N	0/106	-	-
29	H	0/116	-	-
All	All	0/367	-	-

There are no RNA backbone outliers to report.

There are no RNA pucker outliers to report.

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)

There are no ligands in this entry.

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

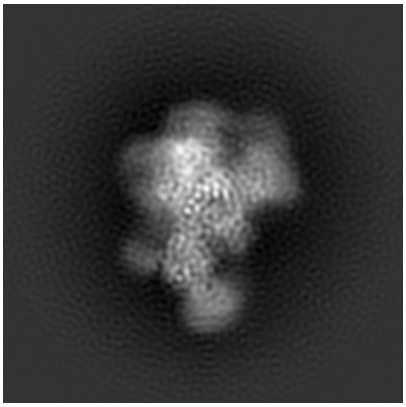
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-6581. These allow visual inspection of the internal detail of the map and identification of artifacts.

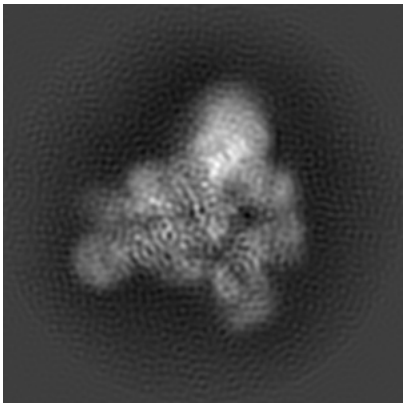
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections

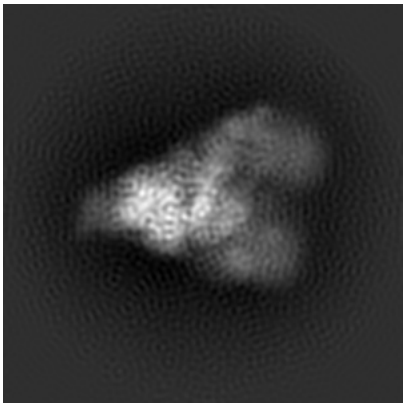
6.1.1 Primary map



X



Y

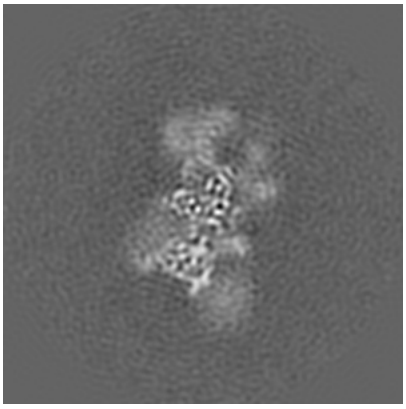


Z

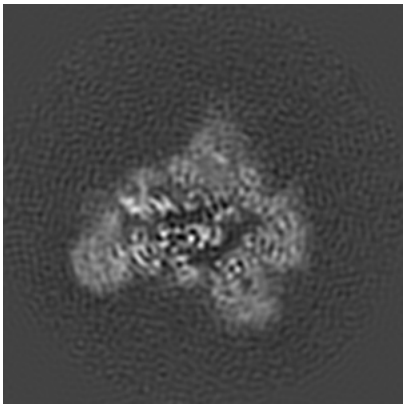
The images above show the map projected in three orthogonal directions.

6.2 Central slices

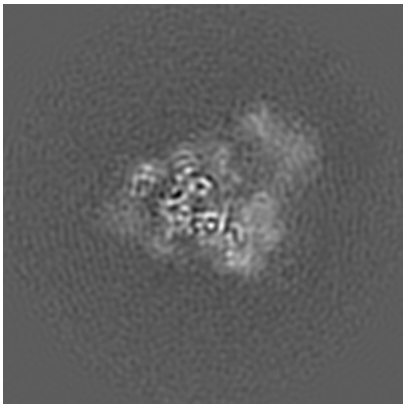
6.2.1 Primary map



X Index: 110



Y Index: 110

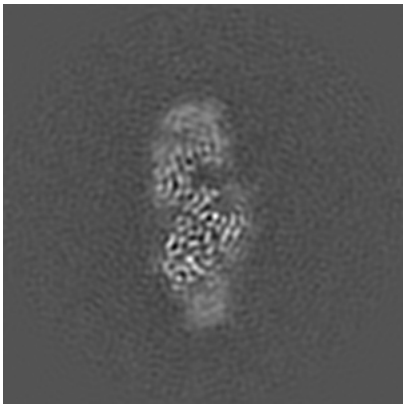


Z Index: 110

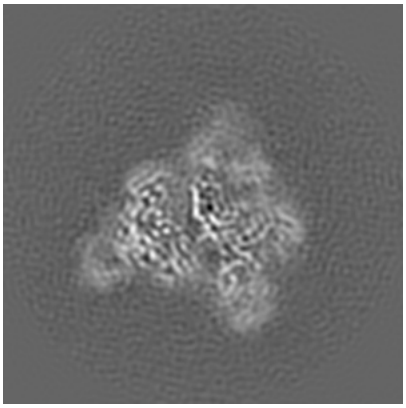
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

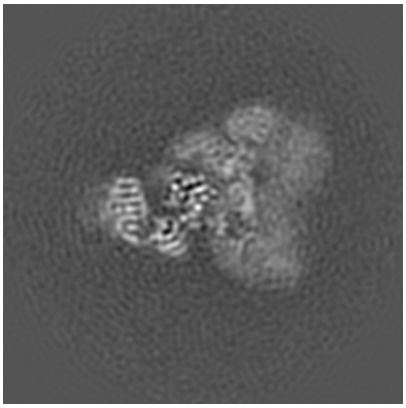
6.3.1 Primary map



X Index: 90



Y Index: 101



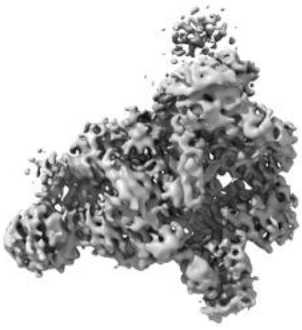
Z Index: 119

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

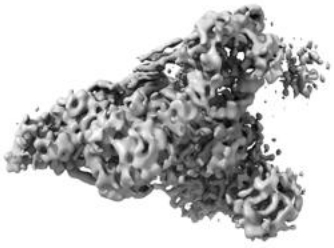
6.4 Orthogonal surface views (i)

6.4.1 Primary map

X



Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.13. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

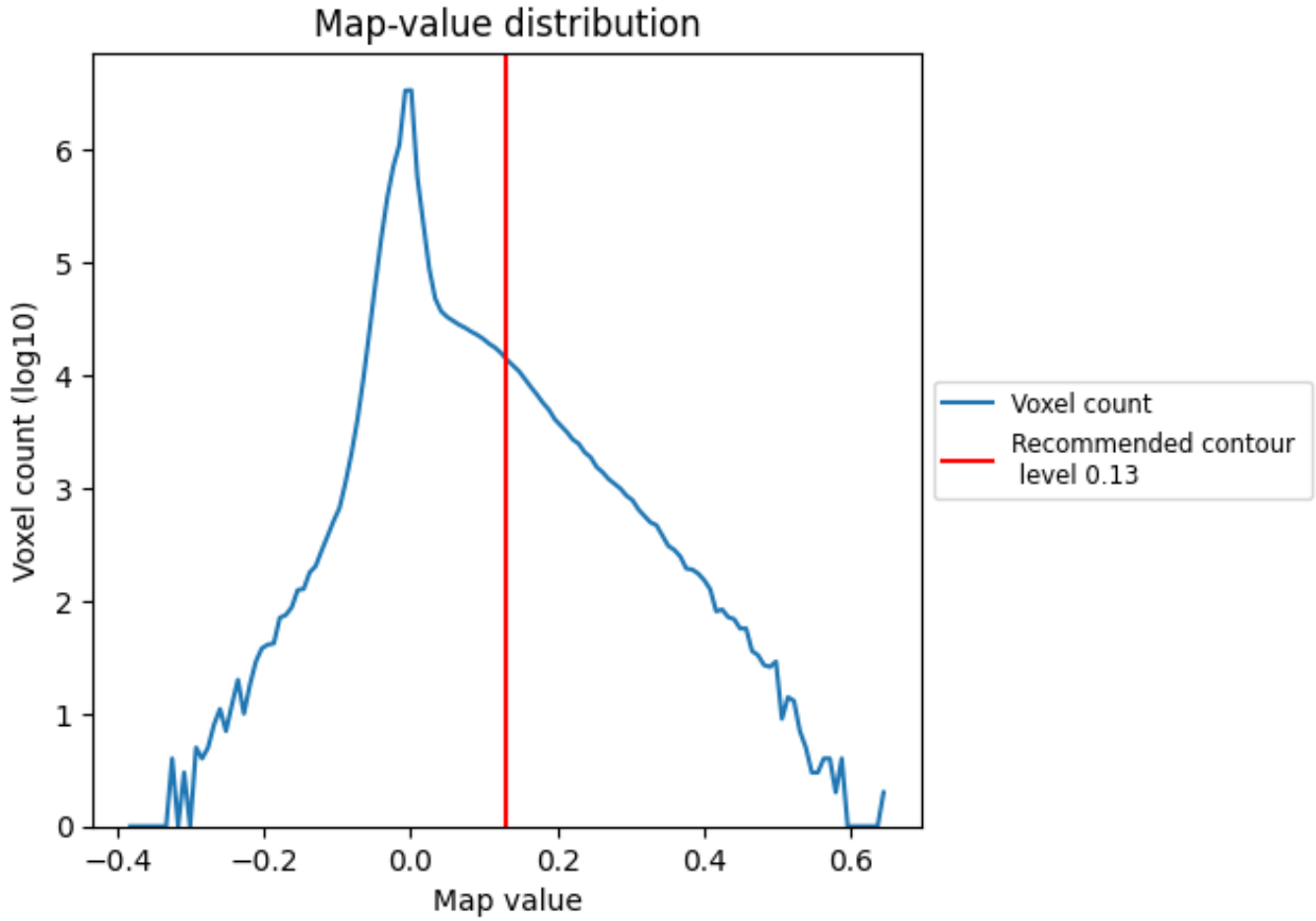
6.5 Mask visualisation (i)

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

7 Map analysis

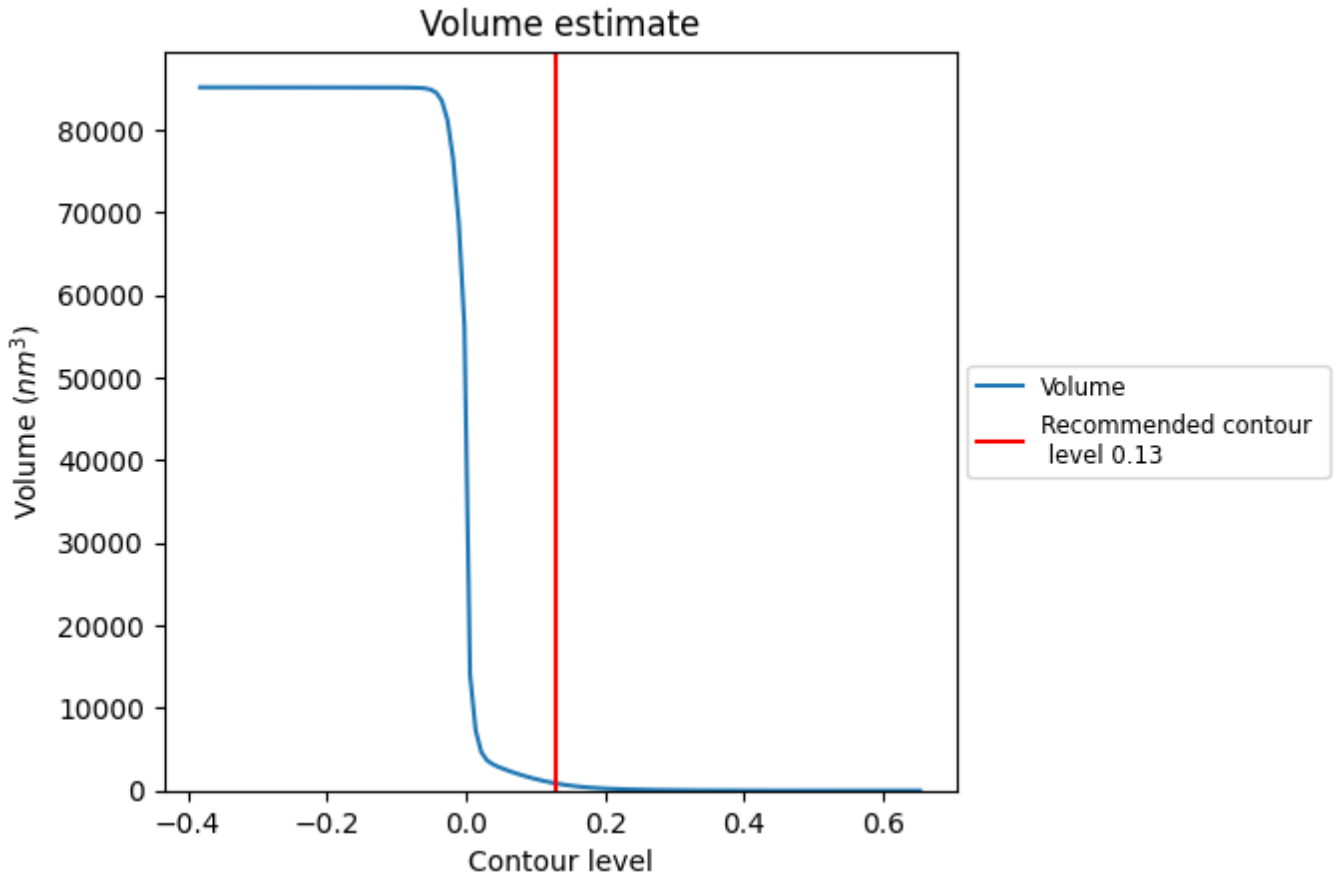
This section contains the results of statistical analysis of the map.

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.

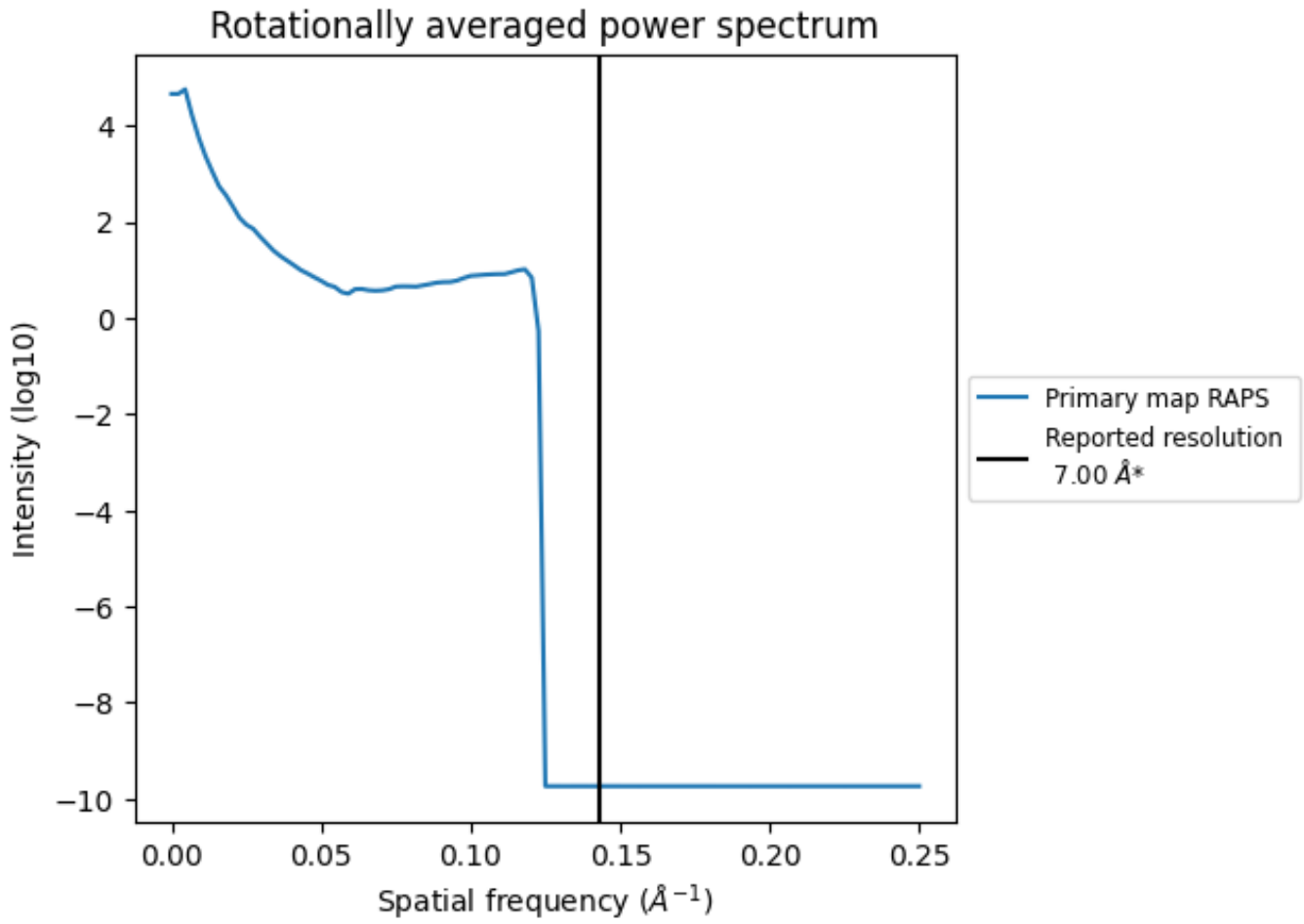
7.2 Volume estimate (i)



The volume at the recommended contour level is 860 nm^3; this corresponds to an approximate mass of 777 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 0.143 Å^{-1}

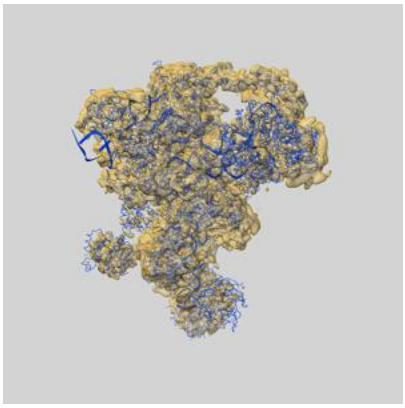
8 Fourier-Shell correlation (i)

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

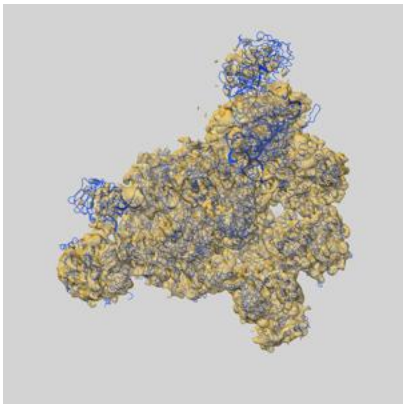
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-6581 and PDB model 3JCR. Per-residue inclusion information can be found in section 3 on page 10.

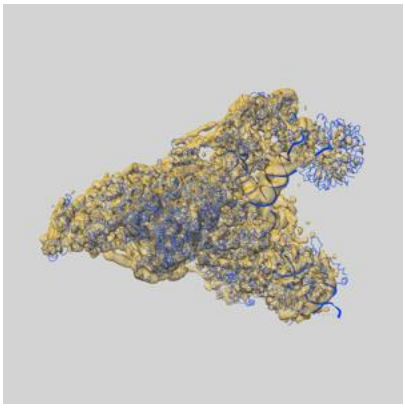
9.1 Map-model overlay



X



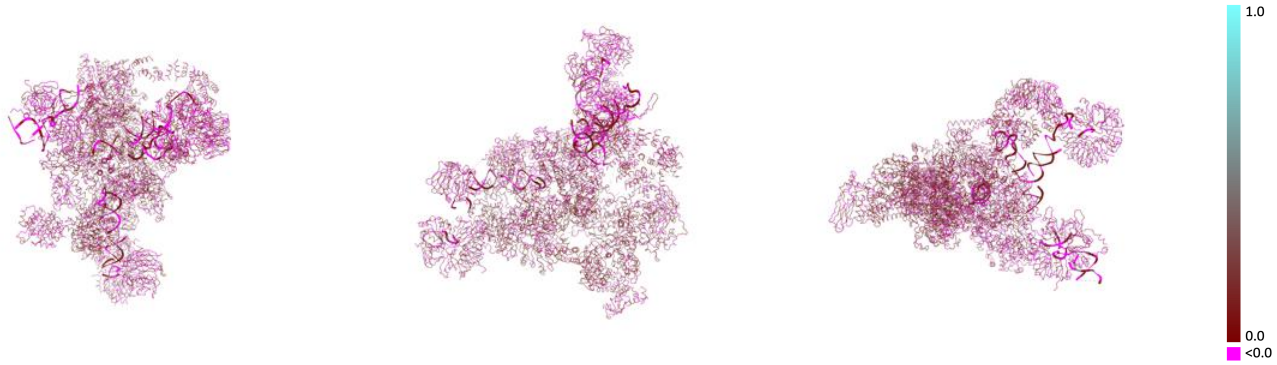
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.13 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.

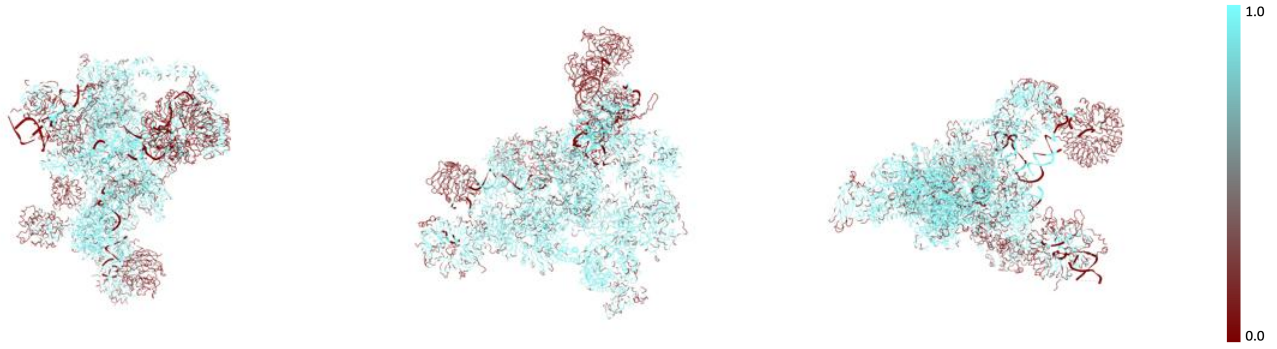
9.2 Q-score mapped to coordinate model (i)



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.

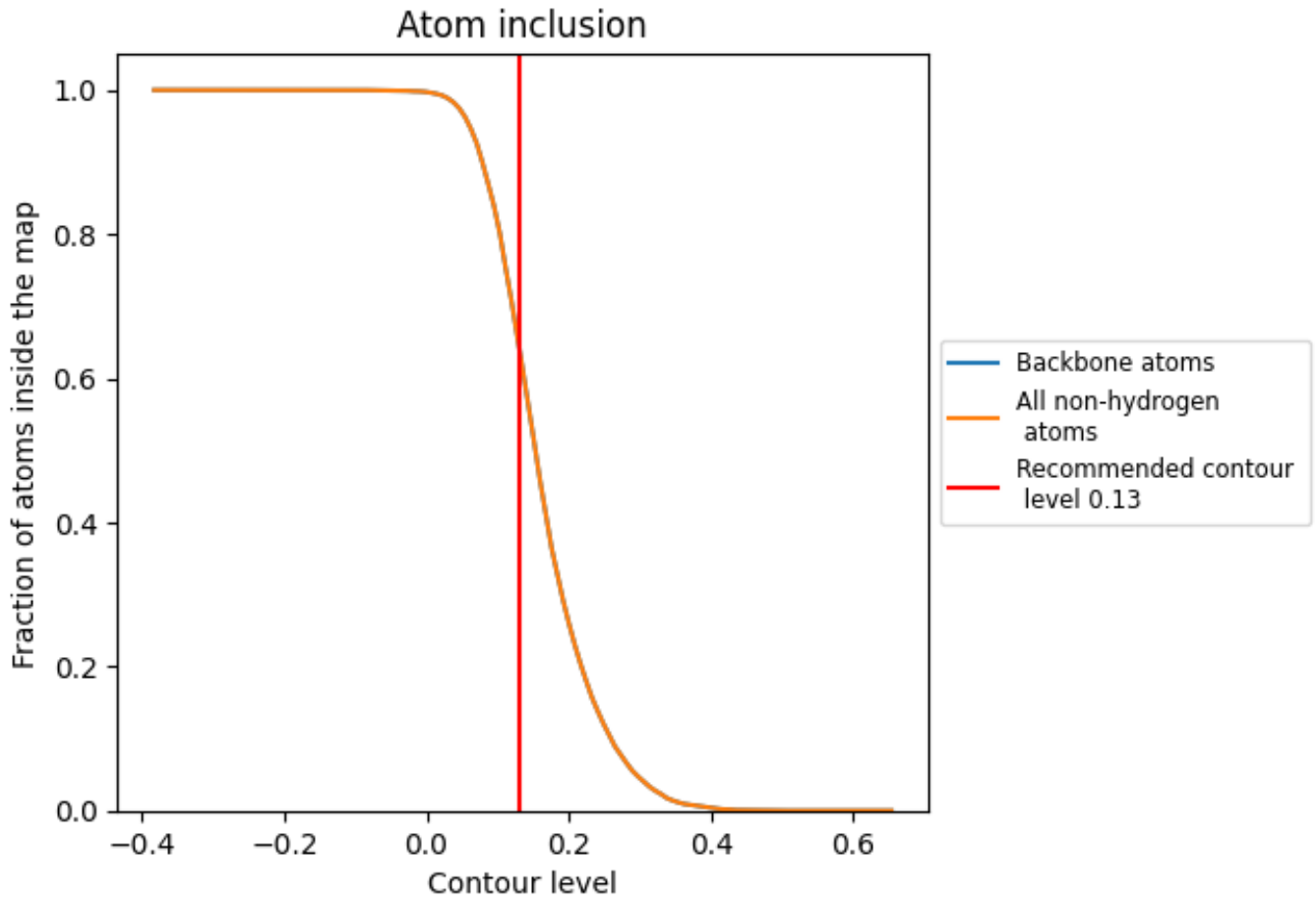
9.3 Atom inclusion mapped to coordinate model (i)



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 (0.13).

9.4 Atom inclusion (i)



At the recommended contour level, 65% of all backbone atoms, 65% 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 (0.13) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.6452	0.0910
2	0.0111	0.0190
3	0.0843	0.0170
4	0.0375	0.0140
5	0.0132	0.0110
6	0.0714	0.0210
7	0.0380	-0.0040
8	0.1000	0.0080
A	0.8074	0.1250
B	0.8578	0.1270
C	0.8037	0.1130
D	0.0795	0.0290
E	0.5778	0.0700
F	0.2345	0.0460
G	0.8110	0.0990
H	0.5556	0.0440
I	0.7698	0.1180
J	0.5439	0.0800
K	0.3664	0.0170
L	0.6515	0.0340
M	0.3398	0.0260
N	0.5676	0.0170
O	0.5843	0.0940
P	0.6237	0.0990
Q	0.6629	0.0960
R	0.7386	0.1090
S	0.5769	0.0660
T	0.6027	0.0890
U	0.6438	0.1020
V	0.7680	0.1080
o	0.4157	0.0430
p	0.2340	0.0330
q	0.2022	0.0130
r	0.4545	0.0020
s	0.3077	0.0390

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Chain	Atom inclusion	Q-score
t	0.1687	0.0170
u	0.5753	0.0900