



# wwPDB EM Validation Summary Report ⓘ

May 19, 2024 – 08:00 am BST

PDB ID : 6TF9  
EMDB ID : EMD-10491  
Title : Structure of the vertebrate gamma-Tubulin Ring Complex  
Authors : Zupa, E.; Pfeffer, S.  
Deposited on : 2019-11-13  
Resolution : 4.80 Å (reported)  
Based on initial model : 3RIP

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

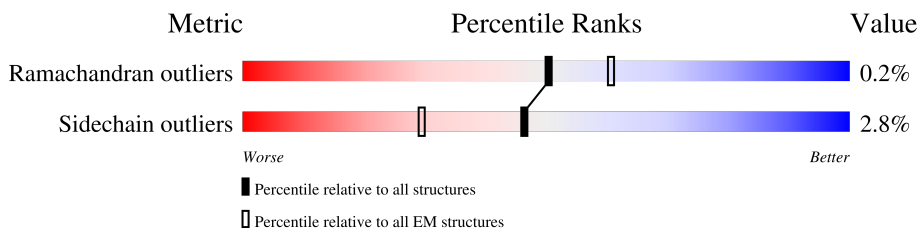
EMDB validation analysis : 0.0.1.dev92  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.13  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.36.2

# 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 4.80 Å.

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



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

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

Mol	Chain	Length	Quality of chain
1	AP1	29	100%
2	CP1	13	100%
2	HP1	13	100%
2	IP1	13	100%
2	XP1	13	100%
3	DP1	31	100%
4	EP1	23	100%
5	FP1	18	100%
6	GP1	15	100%

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Mol	Chain	Length	Quality of chain
6	LP1	15	100%
6	NP1	15	100%
7	JP1	14	7% 100%
7	vP1	14	100%
8	KP1	16	100%
8	OP1	16	100%
8	PP1	16	100%
8	uP1	16	12% 100%
9	MP1	17	6% 100%
10	QP1	906	15% 66% 31%
10	cP1	906	17% 68% 31%
10	dP1	906	15% 67% 31%
10	eP1	906	12% 68% 31%
10	fP1	906	16% 67% 31%
11	RP1	896	10% 61% 38%
11	YP1	896	11% 60% 38%
11	ZP1	896	9% 60% 39%
11	aP1	896	9% 61% 39%
11	bP1	896	11% 61% 38%
12	SP1	1625	8% 34% 65%
13	TP1	451	29% 92%
13	hP1	451	26% 92%
13	iP1	451	40% 92%
13	kP1	451	33% 92%
13	lP1	451	23% 92%

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Mol	Chain	Length	Quality of chain
13	mP1	451	 24% 92% . .
13	nP1	451	 32% 92% . .
13	oP1	451	 27% 92% . .
13	pP1	451	 20% 92% . .
13	qP1	451	 24% 92% . .
13	rP1	451	 42% 92% . .
13	sP1	451	 36% 92% . .
13	tP1	451	 29% 92% . .
13	wP1	451	 28% 92% . .
14	UP1	1019	 10% 55% 44% .
15	VP1	666	 26% 81% 5% 14%
15	WP1	666	 14% 81% 1% 14%
16	gP1	19	 100%
17	jP1	375	 25% 99% .

## 2 Entry composition

There are 17 unique types of molecules in this entry. The entry contains 120053 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 Helix 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
1	AP1	29	146	87	29	30	0	0

- Molecule 2 is a protein called Belt helices 1,2,3,4.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
2	CP1	13	66	39	13	14	0	0
2	HP1	13	66	39	13	14	0	0
2	IP1	13	66	39	13	14	0	0
2	XP1	13	66	39	13	14	0	0

- Molecule 3 is a protein called Belt helix 5.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
3	DP1	31	156	93	31	32	0	0

- Molecule 4 is a protein called Belt helix 6.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
4	EP1	23	116	69	23	24	0	0

- Molecule 5 is a protein called Belt helix 7.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
5	FP1	18	91	54	18	19	0	0

- Molecule 6 is a protein called Belt helices 8,9,10.

Mol	Chain	Residues	Atoms				AltConf	Trace
6	GP1	15	Total	C	N	O	0	0
			76	45	15	16		
6	LP1	15	Total	C	N	O	0	0
			76	45	15	16		
6	NP1	15	Total	C	N	O	0	0
			76	45	15	16		

- Molecule 7 is a protein called Belt helices 11,12.

Mol	Chain	Residues	Atoms				AltConf	Trace
7	JP1	14	Total	C	N	O	0	0
			71	42	14	15		
7	vP1	14	Total	C	N	O	0	0
			71	42	14	15		

- Molecule 8 is a protein called Belt helices 13,14,15 and Helix 2.

Mol	Chain	Residues	Atoms				AltConf	Trace
8	KP1	16	Total	C	N	O	0	0
			81	48	16	17		
8	OP1	16	Total	C	N	O	0	0
			81	48	16	17		
8	PP1	16	Total	C	N	O	0	0
			81	48	16	17		
8	uP1	16	Total	C	N	O	0	0
			81	48	16	17		

- Molecule 9 is a protein called Belt helix 16.

Mol	Chain	Residues	Atoms				AltConf	Trace
9	MP1	17	Total	C	N	O	0	0
			86	51	17	18		

- Molecule 10 is a protein called Gamma-tubulin complex component 3 homolog.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	QP1	625	Total	C	N	O	S	0	0
			5118	3276	880	936	26		
10	cP1	625	Total	C	N	O	S	0	0
			5118	3276	880	936	26		

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Mol	Chain	Residues	Atoms					AltConf	Trace
10	dP1	625	Total	C	N	O	S	0	0
			5118	3276	880	936	26		
10	eP1	625	Total	C	N	O	S	0	0
			5118	3276	880	936	26		
10	fP1	625	Total	C	N	O	S	0	0
			5118	3276	880	936	26		

- Molecule 11 is a protein called Gamma-tubulin complex component 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	RP1	553	Total	C	N	O	S	0	0
			4519	2904	742	841	32		
11	YP1	553	Total	C	N	O	S	0	0
			4519	2904	742	841	32		
11	ZP1	551	Total	C	N	O	S	0	0
			4508	2898	740	838	32		
11	aP1	551	Total	C	N	O	S	0	0
			4503	2894	739	838	32		
11	bP1	553	Total	C	N	O	S	0	0
			4519	2904	742	841	32		

- Molecule 12 is a protein called Gamma tubulin ring protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	SP1	576	Total	C	N	O	S	0	0
			4699	3068	765	843	23		

- Molecule 13 is a protein called Tubulin gamma-1 chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	TP1	436	Total	C	N	O	S	0	0
			3479	2188	615	662	14		
13	hP1	436	Total	C	N	O	S	0	0
			3479	2188	615	662	14		
13	iP1	436	Total	C	N	O	S	0	0
			3479	2188	615	662	14		
13	kP1	436	Total	C	N	O	S	0	0
			3479	2188	615	662	14		
13	lP1	436	Total	C	N	O	S	0	0
			3479	2188	615	662	14		
13	mP1	436	Total	C	N	O	S	0	0
			3479	2188	615	662	14		

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Mol	Chain	Residues	Atoms					AltConf	Trace
13	nP1	436	Total	C	N	O	S	0	0
			3479	2188	615	662	14		
13	oP1	436	Total	C	N	O	S	0	0
			3479	2188	615	662	14		
13	pP1	436	Total	C	N	O	S	0	0
			3479	2188	615	662	14		
13	qP1	436	Total	C	N	O	S	0	0
			3479	2188	615	662	14		
13	rP1	436	Total	C	N	O	S	0	0
			3479	2188	615	662	14		
13	sP1	436	Total	C	N	O	S	0	0
			3479	2188	615	662	14		
13	tP1	436	Total	C	N	O	S	0	0
			3479	2188	615	662	14		
13	wP1	436	Total	C	N	O	S	0	0
			3479	2188	615	662	14		

- Molecule 14 is a protein called Gamma-tubulin complex component.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	UP1	569	Total	C	N	O	S	0	0
			4679	3041	787	825	26		

- Molecule 15 is a protein called Gamma-tubulin complex component.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	VP1	571	Total	C	N	O	S	0	0
			4635	2993	790	831	21		
15	WP1	571	Total	C	N	O	S	0	0
			4635	2993	790	831	21		

- Molecule 16 is a protein called Belt helix 17.

Mol	Chain	Residues	Atoms				AltConf	Trace
16	gP1	19	Total	C	N	O	0	0
			96	57	19	20		

- Molecule 17 is a protein called Actin, cytoplasmic 1.

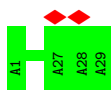
Mol	Chain	Residues	Atoms					AltConf	Trace
17	jP1	371	Total	C	N	O	S	0	0
			2892	1828	486	557	21		



### 3 Residue-property plots

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

- Molecule 1: Helix 1

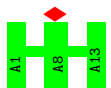


- Molecule 2: Belt helices 1,2,3,4



There are no outlier residues recorded for this chain.

- Molecule 2: Belt helices 1,2,3,4



- Molecule 2: Belt helices 1,2,3,4



- Molecule 2: Belt helices 1,2,3,4



There are no outlier residues recorded for this chain.

- Molecule 3: Belt helix 5



There are no outlier residues recorded for this chain.

- Molecule 4: Belt helix 6

Chain EP1: 100%

There are no outlier residues recorded for this chain.

- Molecule 5: Belt helix 7

Chain FP1: 100%

There are no outlier residues recorded for this chain.

- Molecule 6: Belt helices 8,9,10

Chain GP1: 100%



- Molecule 6: Belt helices 8,9,10

Chain LP1: 100%

There are no outlier residues recorded for this chain.

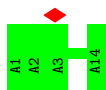
- Molecule 6: Belt helices 8,9,10

Chain NP1: 100%

There are no outlier residues recorded for this chain.

- Molecule 7: Belt helices 11,12

Chain JP1: 100%



- Molecule 7: Belt helices 11,12

Chain vP1: 100%

There are no outlier residues recorded for this chain.

- Molecule 8: Belt helices 13,14,15 and Helix 2

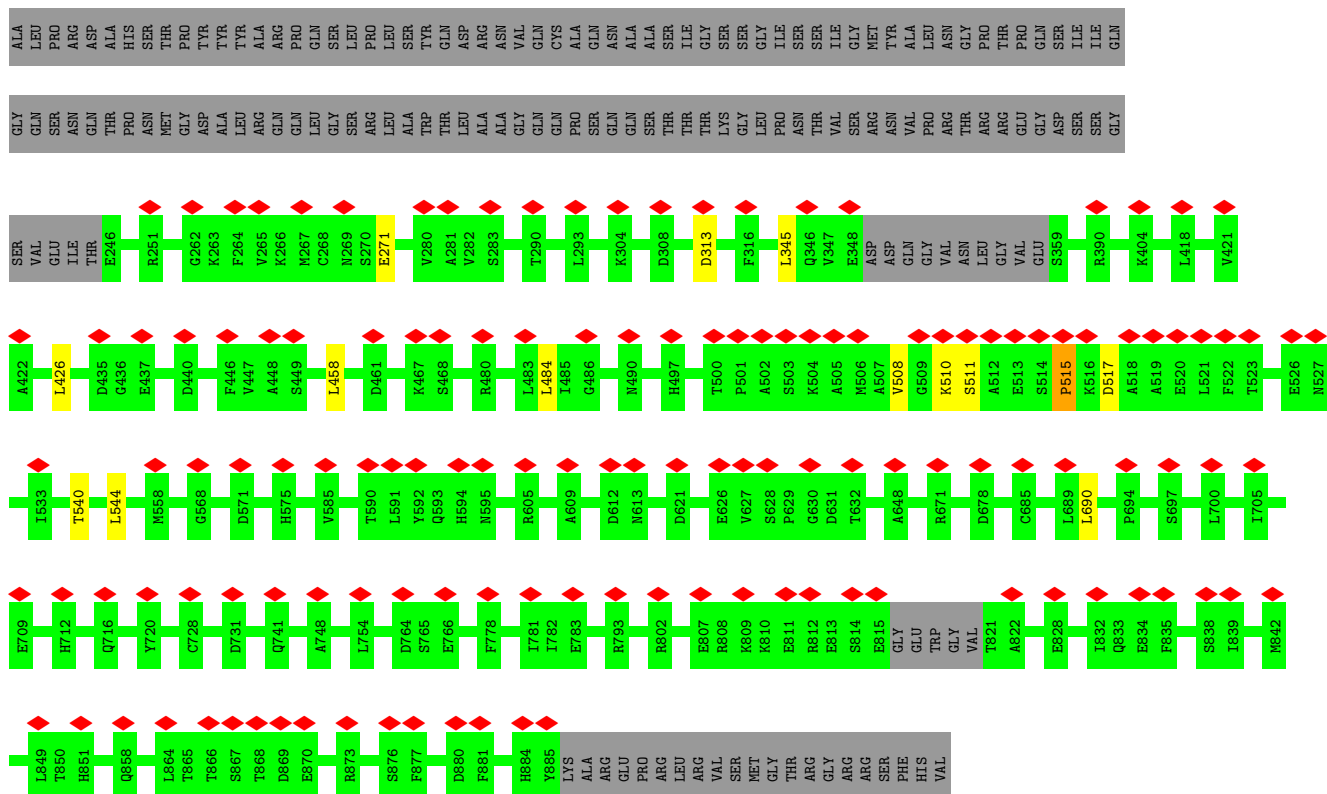
Chain KP1: 100%

There are no outlier residues recorded for this chain.

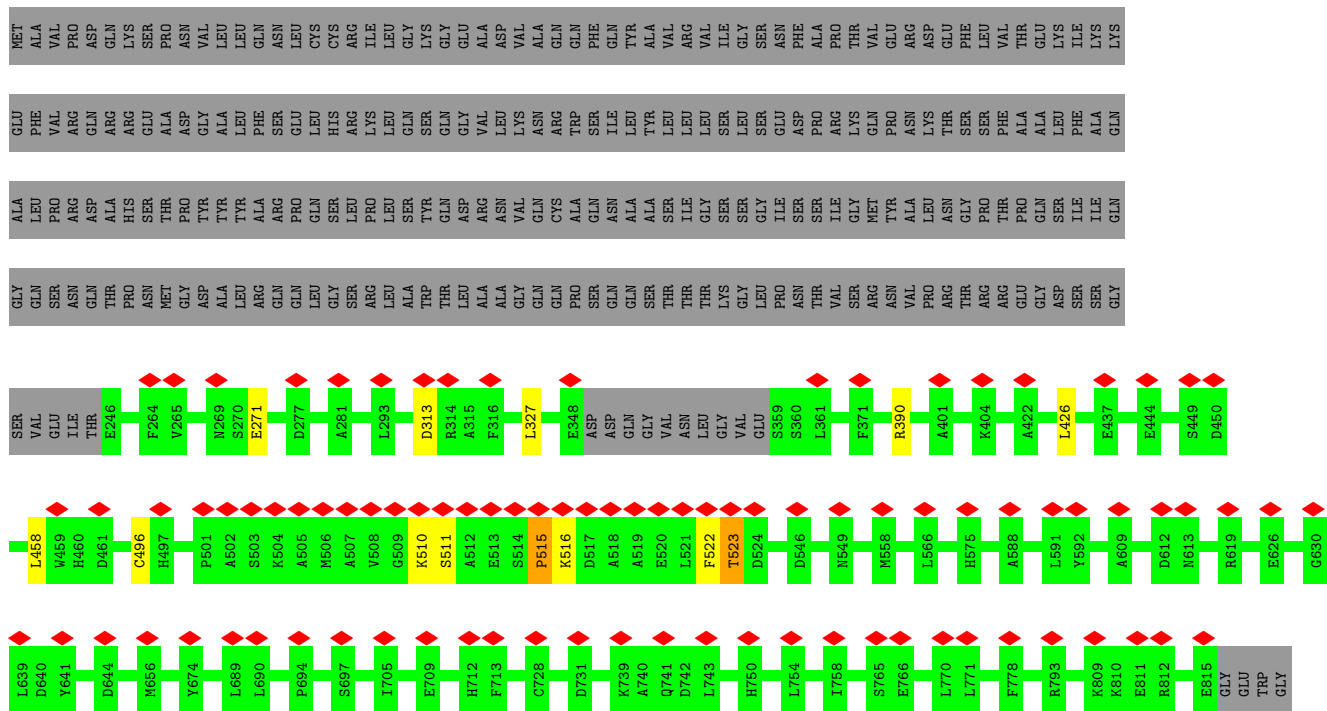
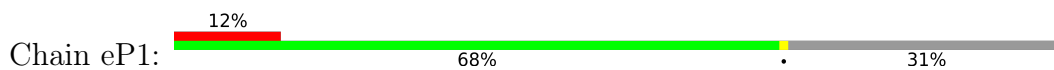
- Molecule 8: Belt helices 13,14,15 and Helix 2



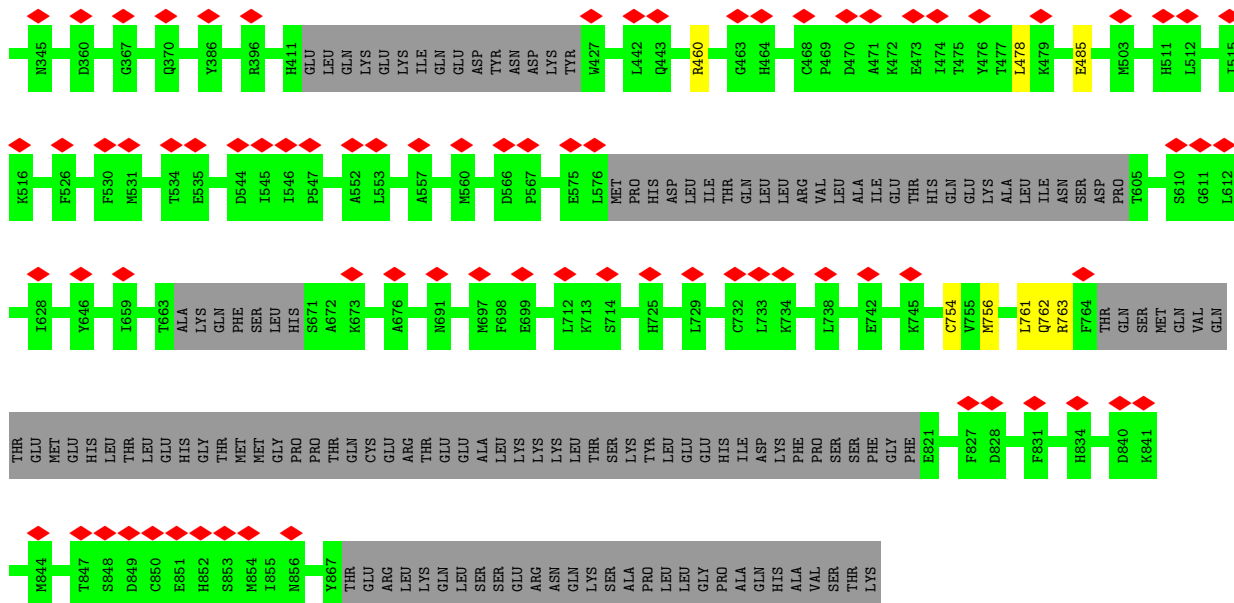




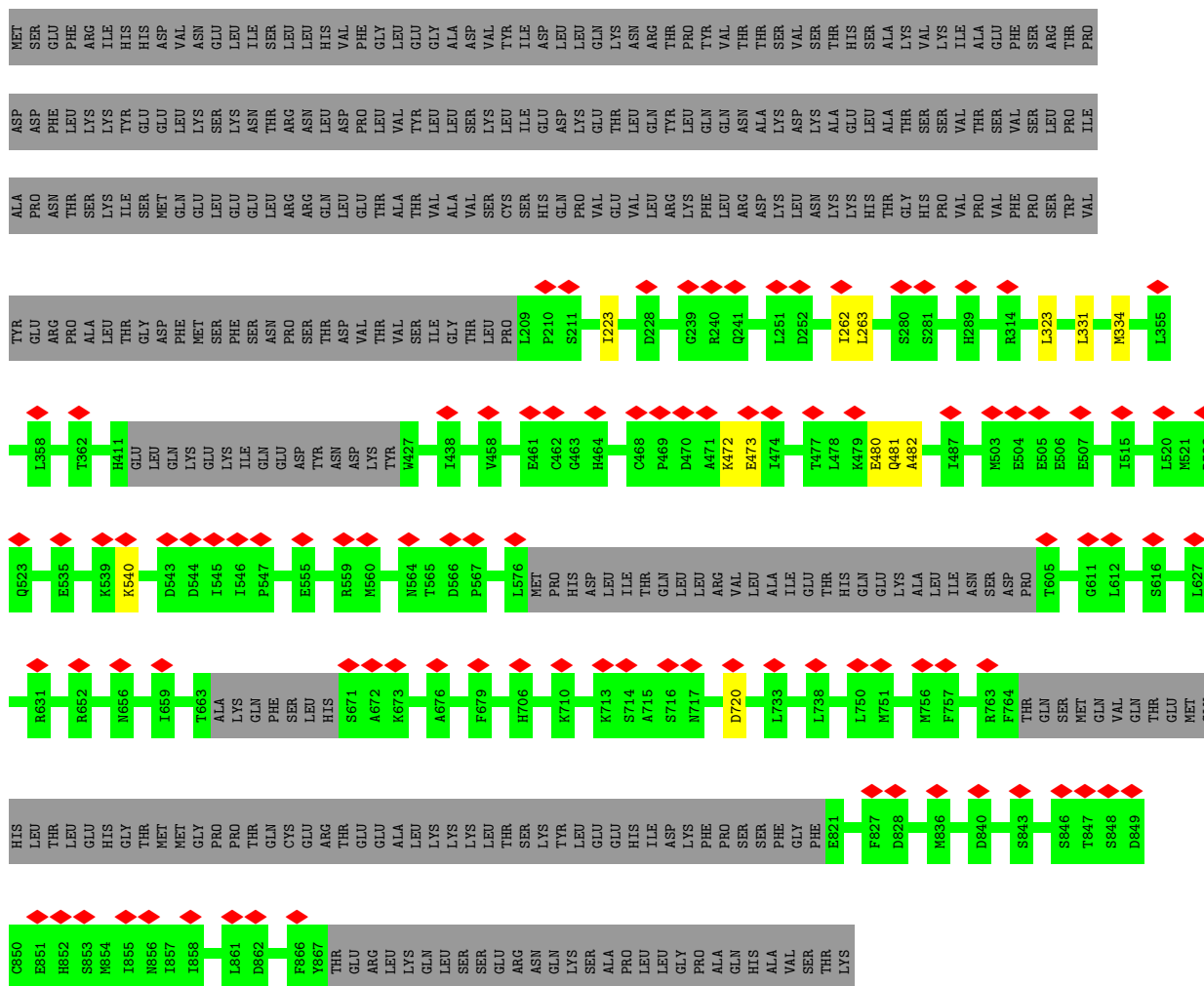
● Molecule 10: Gamma-tubulin complex component 3 homolog







● Molecule 11: Gamma-tubulin complex component 2

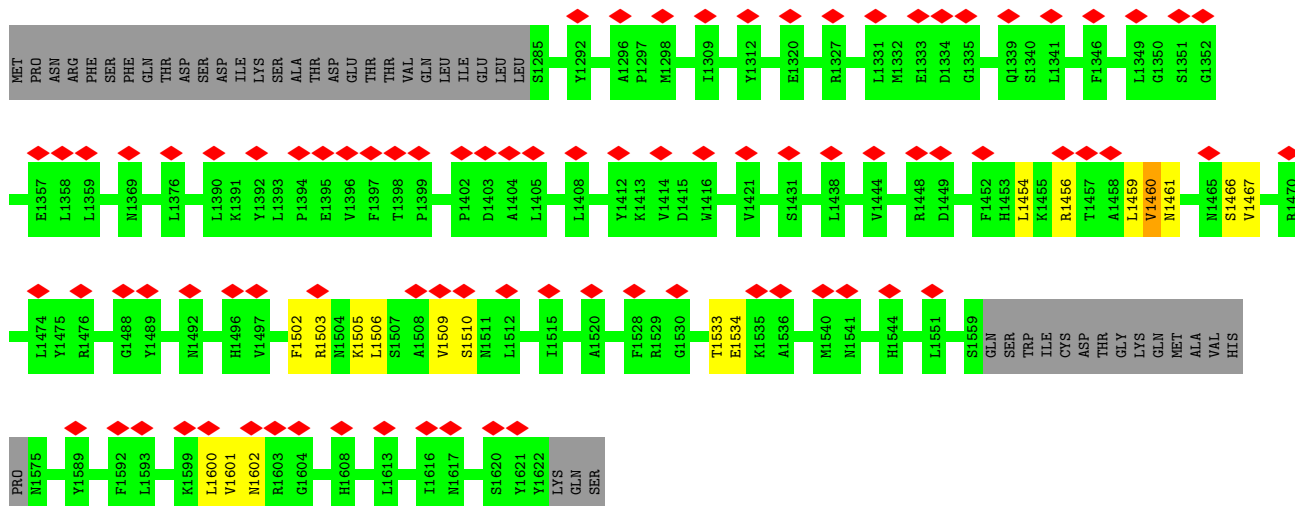




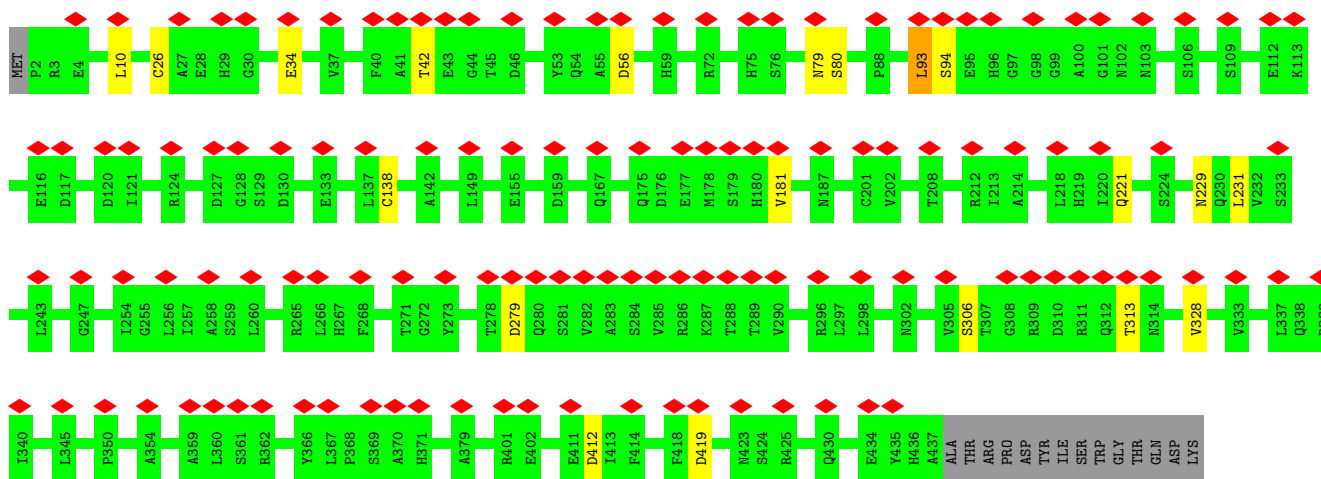




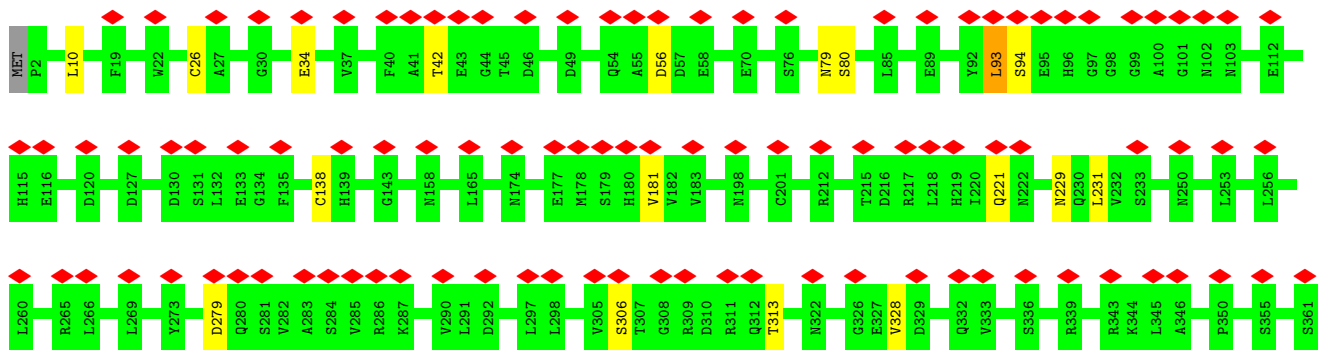


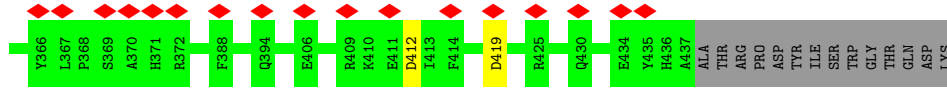


• Molecule 13: Tubulin gamma-1 chain

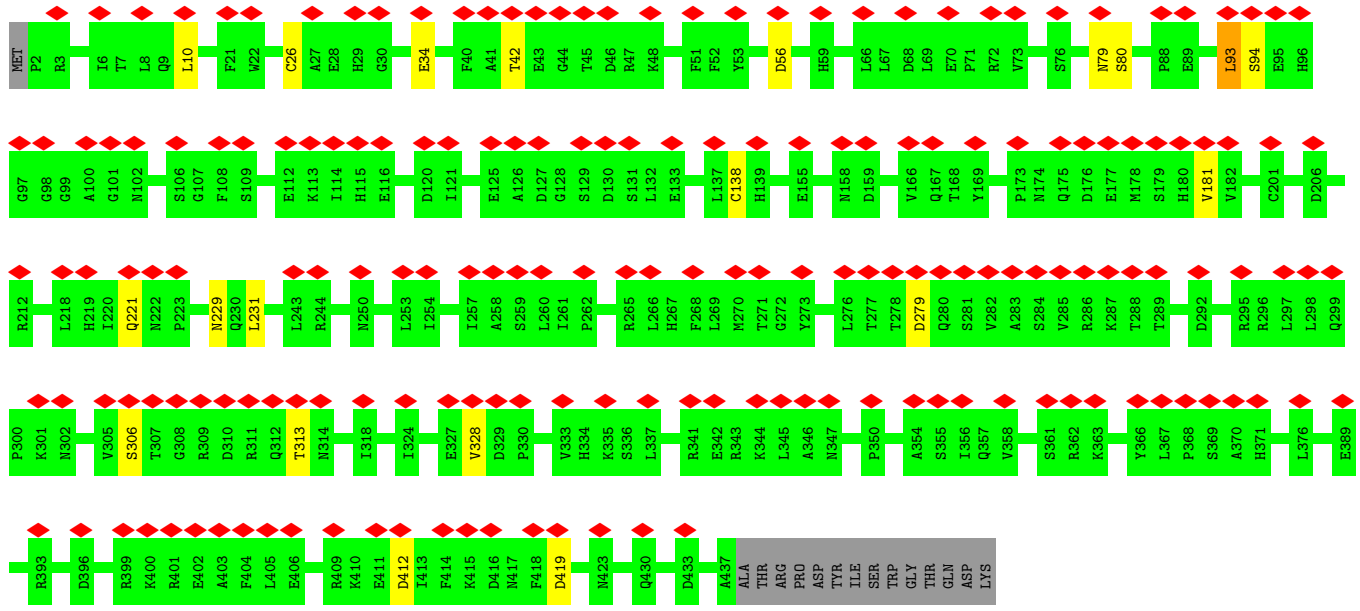
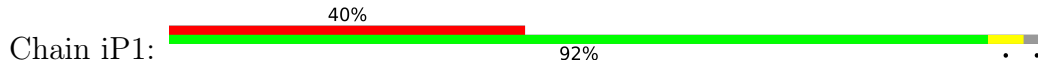


• Molecule 13: Tubulin gamma-1 chain

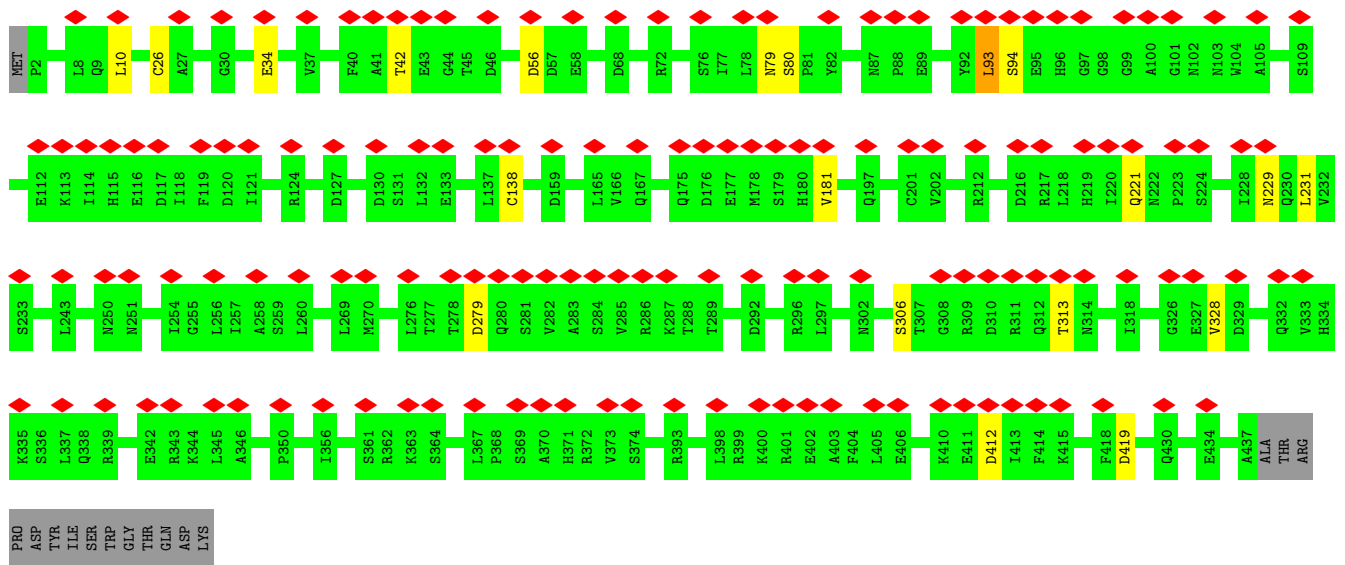




● Molecule 13: Tubulin gamma-1 chain

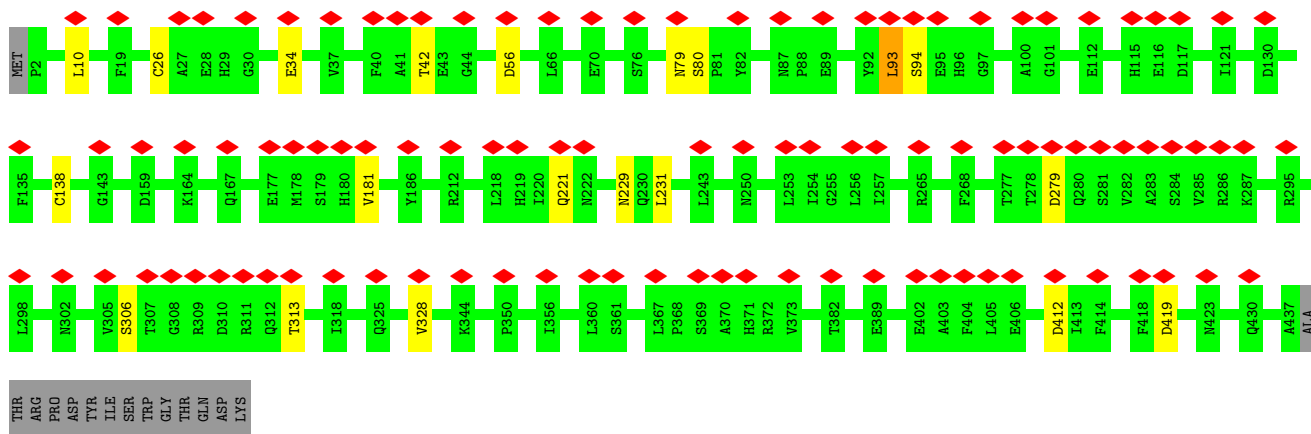


● Molecule 13: Tubulin gamma-1 chain

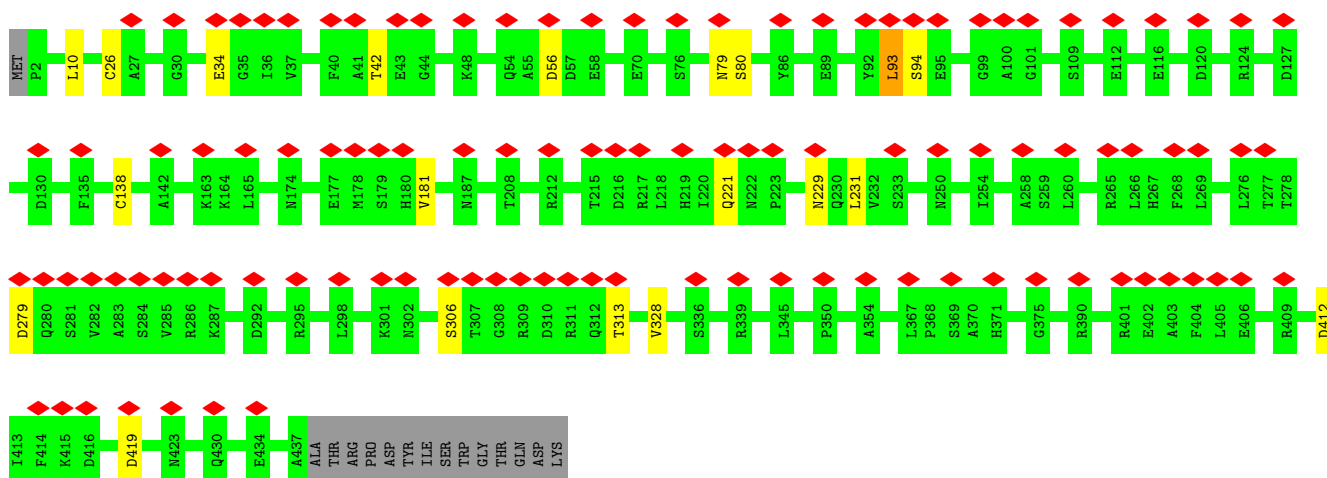


● Molecule 13: Tubulin gamma-1 chain

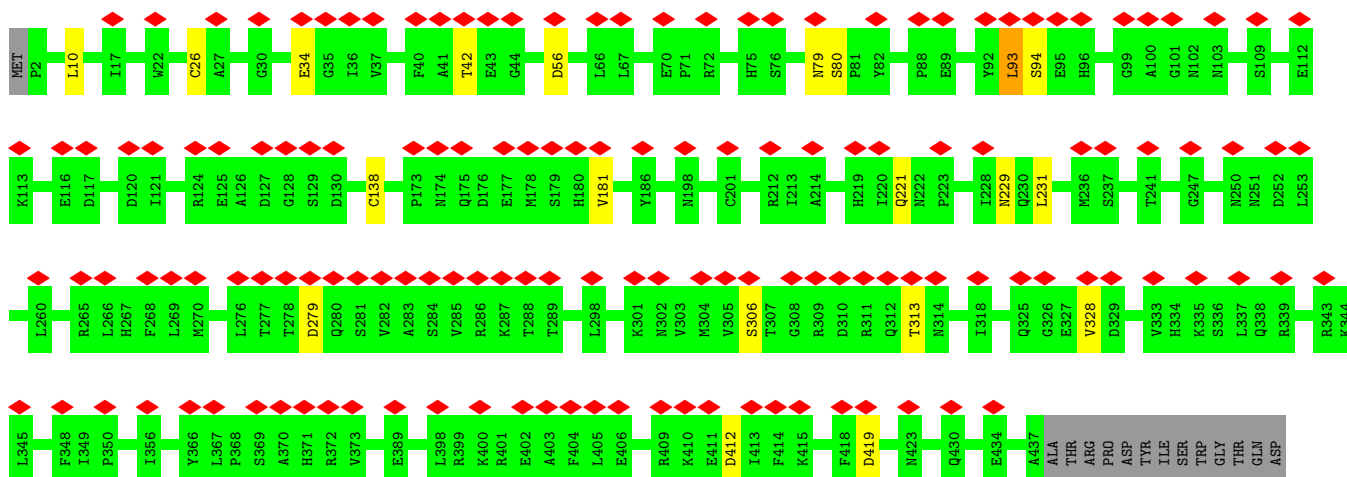




- Molecule 13: Tubulin gamma-1 chain

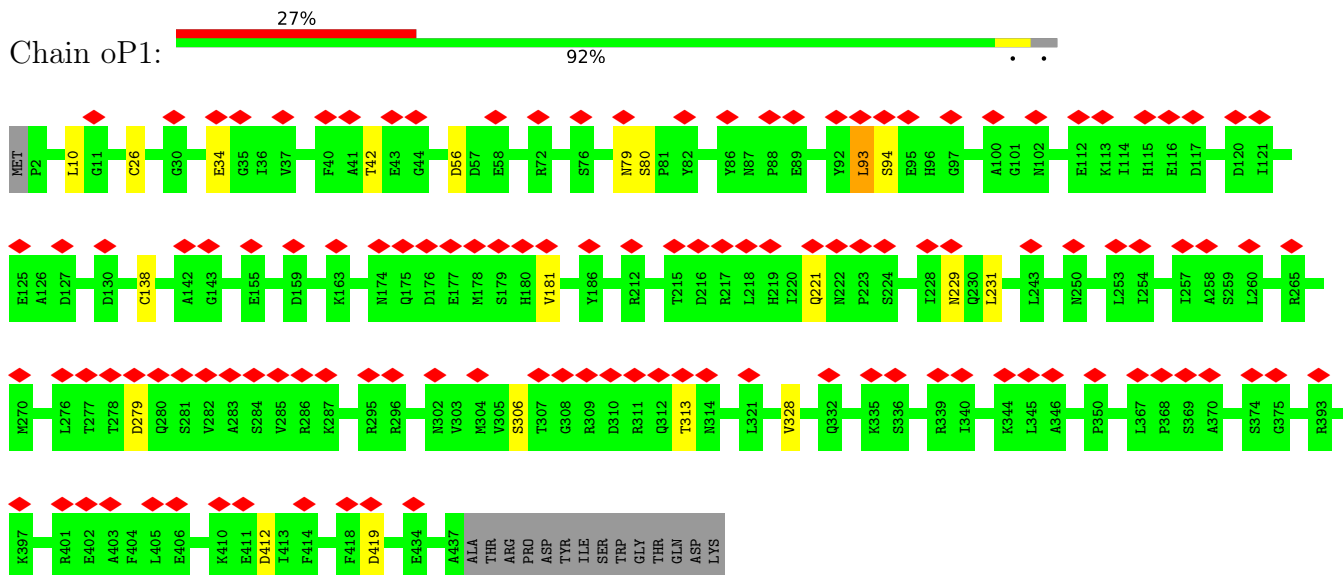


- Molecule 13: Tubulin gamma-1 chain

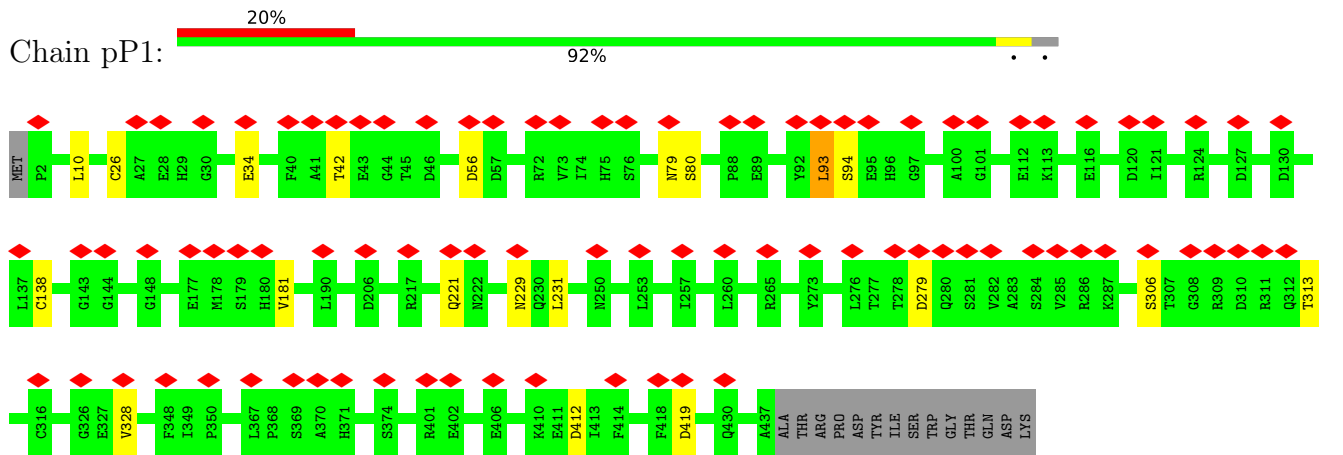


LYS

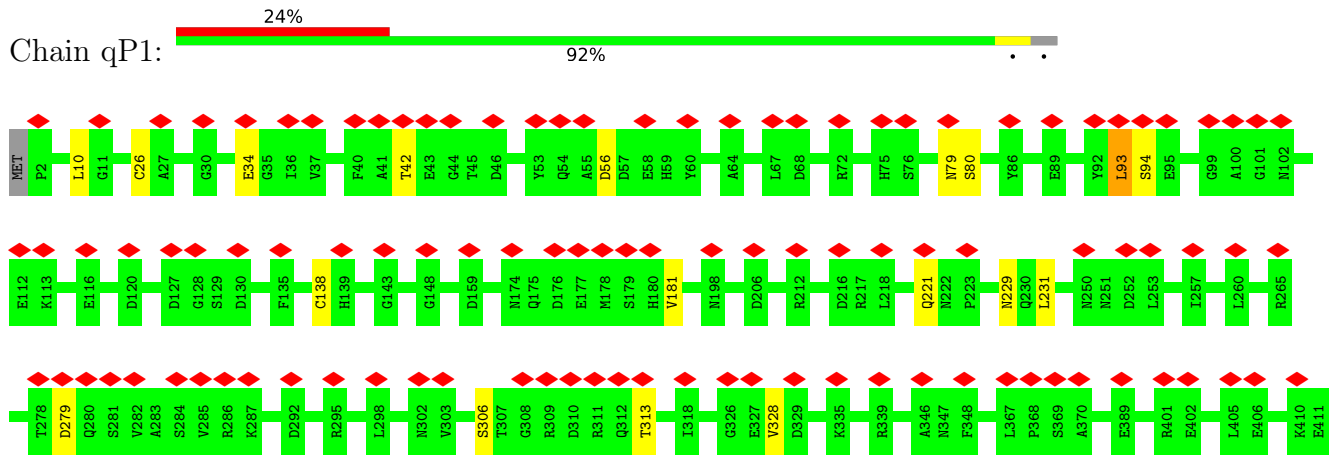
• Molecule 13: Tubulin gamma-1 chain

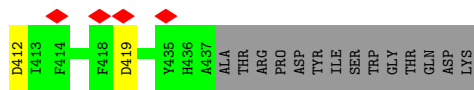


• Molecule 13: Tubulin gamma-1 chain



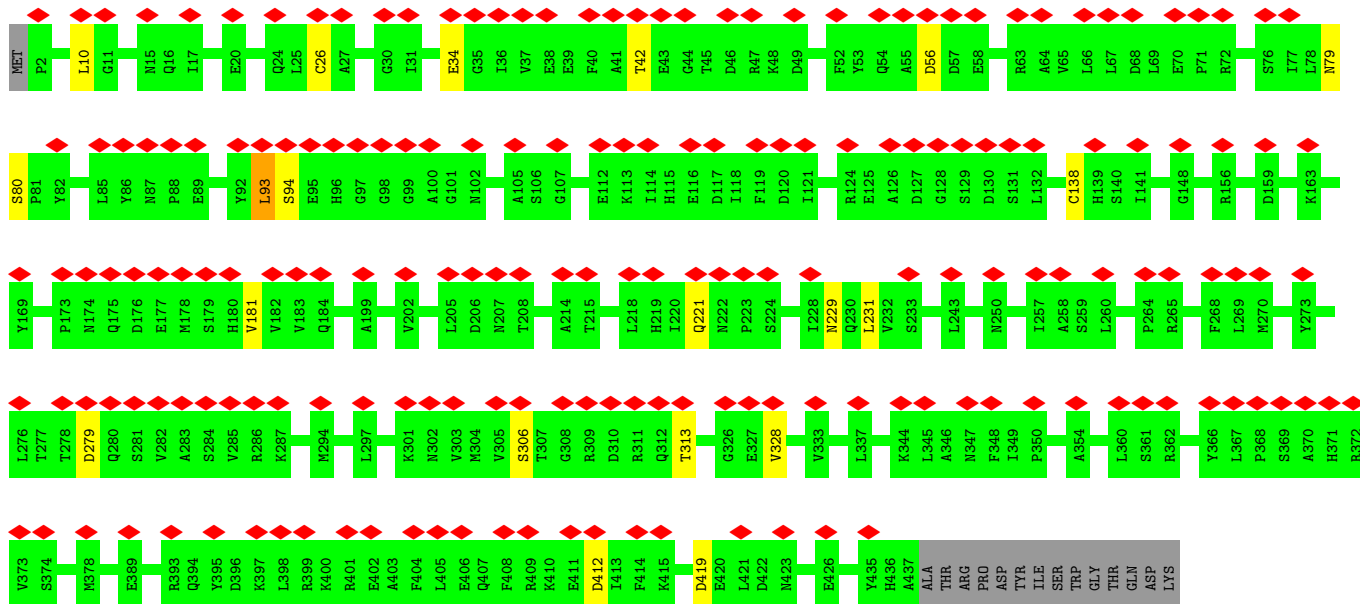
• Molecule 13: Tubulin gamma-1 chain





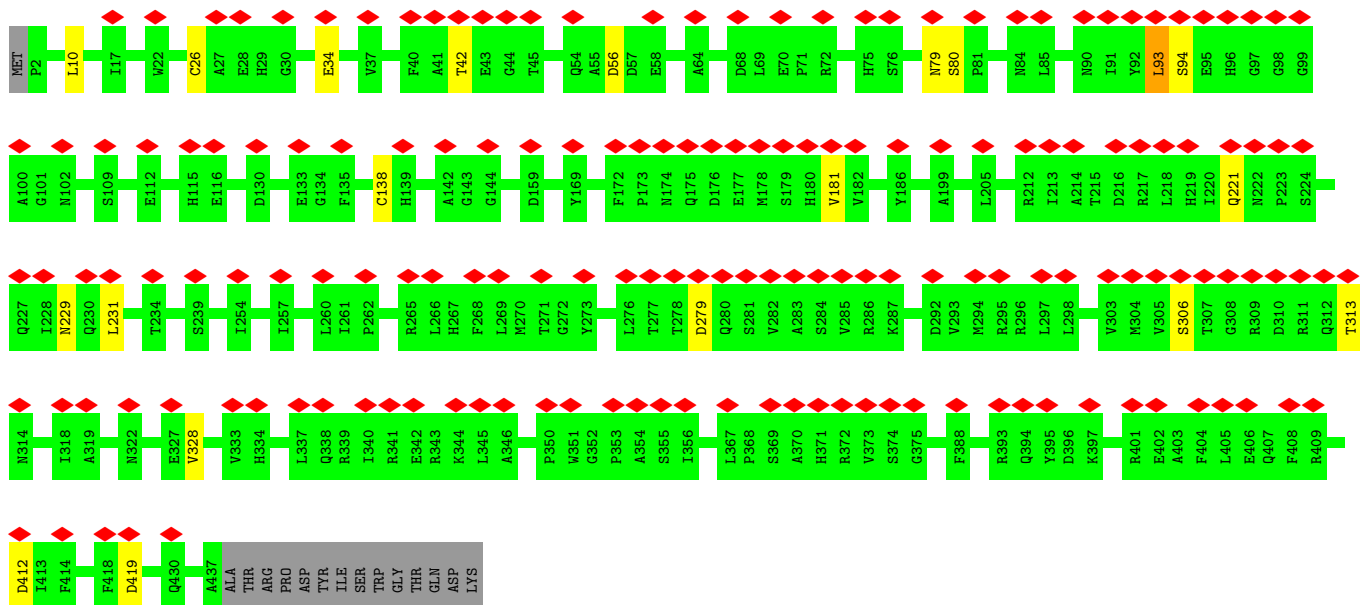
- Molecule 13: Tubulin gamma-1 chain

Chain rP1: 42% 92%



- Molecule 13: Tubulin gamma-1 chain

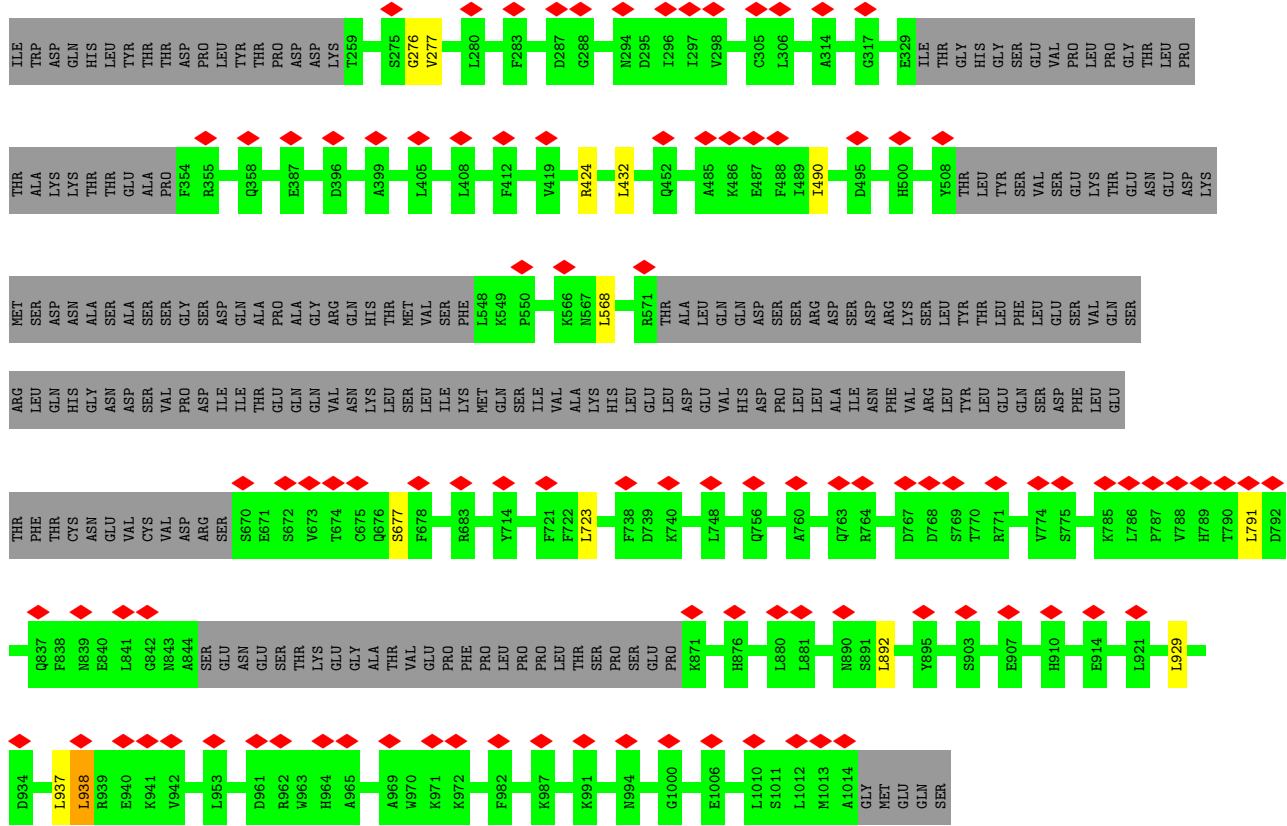
Chain sP1: 36% 92%



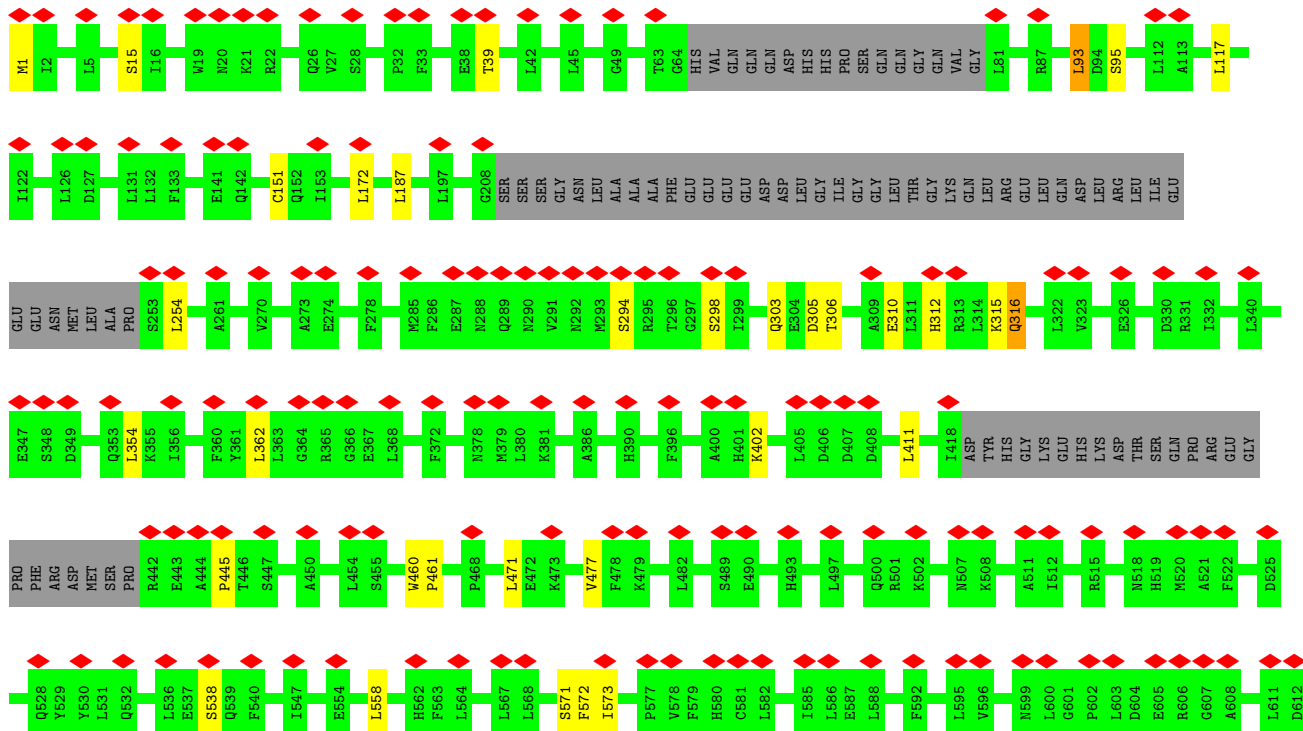
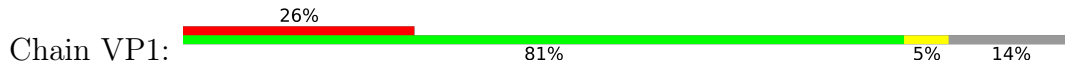
- Molecule 13: Tubulin gamma-1 chain

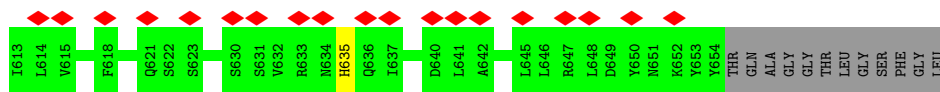




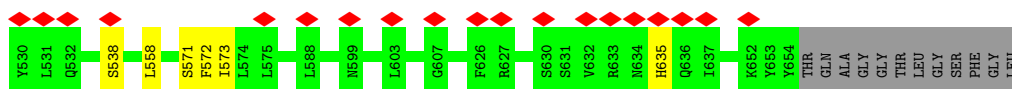
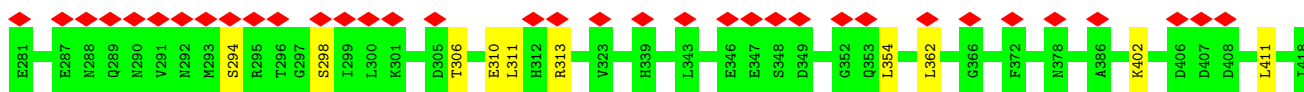
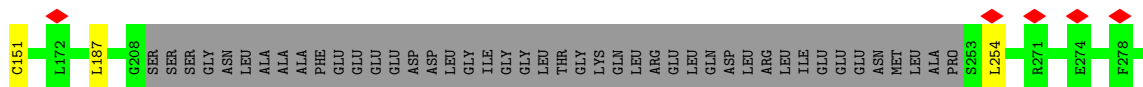
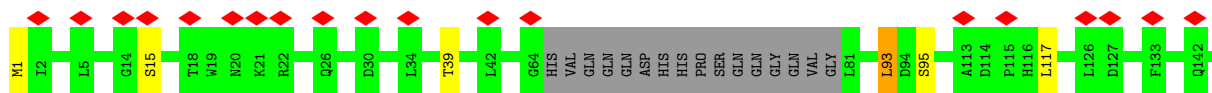
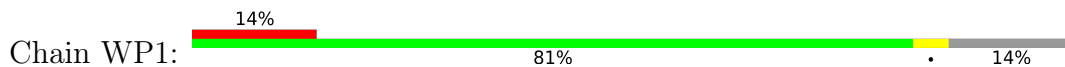


• Molecule 15: Gamma-tubulin complex component





• Molecule 15: Gamma-tubulin complex component

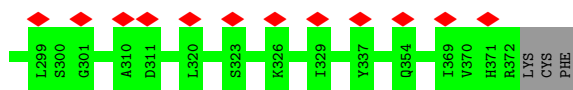
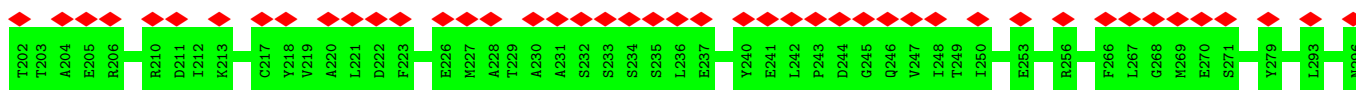
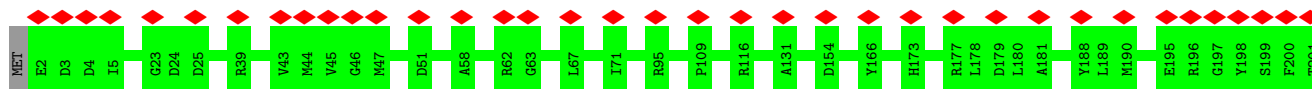


• Molecule 16: Belt helix 17



There are no outlier residues recorded for this chain.

• Molecule 17: Actin, cytoplasmic 1



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	46096	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	46	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	3500	Depositor
Magnification	42000	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.247	Depositor
Minimum map value	-0.079	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.007	Depositor
Recommended contour level	0.04	Depositor
Map size (Å)	537.6, 537.6, 537.6	wwPDB
Map dimensions	256, 256, 256	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	2.1, 2.1, 2.1	Depositor

## 5 Model quality [i](#)

### 5.1 Standard geometry [i](#)

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
1	AP1	0.25	0/145	0.25	0/200
2	CP1	0.24	0/65	0.25	0/88
2	HP1	0.24	0/65	0.26	0/88
2	IP1	0.25	0/65	0.25	0/88
2	XP1	0.24	0/65	0.26	0/88
3	DP1	0.28	0/155	0.31	0/214
4	EP1	0.25	0/115	0.25	0/158
5	FP1	0.25	0/90	0.25	0/123
6	GP1	0.25	0/75	0.25	0/102
6	LP1	0.25	0/75	0.27	0/102
6	NP1	0.24	0/75	0.25	0/102
7	JP1	0.24	0/70	0.25	0/95
7	vP1	0.24	0/70	0.25	0/95
8	KP1	0.24	0/80	0.25	0/109
8	OP1	0.25	0/80	0.27	0/109
8	PP1	0.25	0/80	0.25	0/109
8	uP1	0.25	0/80	0.30	0/109
9	MP1	0.24	0/85	0.25	0/116
10	QP1	0.32	0/5227	0.65	8/7060 (0.1%)
10	cP1	0.31	0/5227	0.62	6/7060 (0.1%)
10	dP1	0.30	0/5227	0.64	7/7060 (0.1%)
10	eP1	0.29	0/5227	0.61	5/7060 (0.1%)
10	fP1	0.30	0/5227	0.62	8/7060 (0.1%)
11	RP1	0.35	0/4614	0.68	4/6236 (0.1%)
11	YP1	0.34	0/4614	0.65	6/6236 (0.1%)
11	ZP1	0.32	0/4603	0.63	4/6221 (0.1%)
11	aP1	0.30	0/4598	0.60	2/6215 (0.0%)
11	bP1	0.30	0/4614	0.62	8/6236 (0.1%)
12	SP1	0.33	0/4812	0.70	5/6525 (0.1%)
13	TP1	0.28	0/3551	0.54	2/4815 (0.0%)
13	hP1	0.28	0/3551	0.54	2/4815 (0.0%)
13	iP1	0.28	0/3551	0.54	2/4815 (0.0%)
13	kP1	0.28	0/3551	0.54	2/4815 (0.0%)
13	lP1	0.28	0/3551	0.54	2/4815 (0.0%)

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	# Z  >5	RMSZ	# Z  >5
13	mP1	0.28	0/3551	0.54	2/4815 (0.0%)
13	nP1	0.28	0/3551	0.54	2/4815 (0.0%)
13	oP1	0.28	0/3551	0.54	2/4815 (0.0%)
13	pP1	0.28	0/3551	0.54	2/4815 (0.0%)
13	qP1	0.28	0/3551	0.54	2/4815 (0.0%)
13	rP1	0.28	0/3551	0.54	2/4815 (0.0%)
13	sP1	0.28	0/3551	0.54	2/4815 (0.0%)
13	tP1	0.28	0/3551	0.54	2/4815 (0.0%)
13	wP1	0.28	0/3551	0.54	2/4815 (0.0%)
14	UP1	0.31	0/4778	0.68	8/6459 (0.1%)
15	VP1	0.33	0/4738	0.68	8/6416 (0.1%)
15	WP1	0.32	0/4738	0.68	7/6416 (0.1%)
16	gP1	0.25	0/95	0.25	0/130
17	jP1	0.26	0/2954	0.51	0/4003
All	All	0.30	0/122542	0.60	114/165898 (0.1%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
10	QP1	0	3
10	cP1	0	2
10	dP1	0	2
10	eP1	0	4
10	fP1	0	3
11	RP1	0	1
11	YP1	0	2
11	ZP1	0	5
11	aP1	0	3
11	bP1	0	2
12	SP1	0	11
14	UP1	0	5
15	VP1	0	3
15	WP1	0	3
All	All	0	49

There are no bond length outliers.

The worst 5 of 114 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
10	dP1	544	LEU	CB-CG-CD2	-9.72	94.47	111.00
11	bP1	556	LEU	CA-CB-CG	8.40	134.62	115.30
14	UP1	791	LEU	CA-CB-CG	8.34	134.49	115.30
11	RP1	263	LEU	CA-CB-CG	7.87	133.39	115.30
10	QP1	254	LEU	CB-CG-CD1	-7.74	97.84	111.00

There are no chirality outliers.

5 of 49 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
10	QP1	271	GLU	Peptide
10	QP1	311	SER	Peptide
10	QP1	318	LEU	Peptide
11	RP1	485	GLU	Sidechain
12	SP1	312	TYR	Peptide

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

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

## 5.3 Torsion angles [i](#)

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

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	AP1	27/29 (93%)	27 (100%)	0	0	100	100
2	CP1	11/13 (85%)	11 (100%)	0	0	100	100
2	HP1	11/13 (85%)	11 (100%)	0	0	100	100
2	IP1	11/13 (85%)	11 (100%)	0	0	100	100
2	XP1	11/13 (85%)	11 (100%)	0	0	100	100
3	DP1	29/31 (94%)	29 (100%)	0	0	100	100
4	EP1	21/23 (91%)	21 (100%)	0	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
5	FP1	16/18 (89%)	16 (100%)	0	0	100	100
6	GP1	13/15 (87%)	13 (100%)	0	0	100	100
6	LP1	13/15 (87%)	13 (100%)	0	0	100	100
6	NP1	13/15 (87%)	13 (100%)	0	0	100	100
7	JP1	12/14 (86%)	12 (100%)	0	0	100	100
7	vP1	12/14 (86%)	12 (100%)	0	0	100	100
8	KP1	14/16 (88%)	14 (100%)	0	0	100	100
8	OP1	14/16 (88%)	14 (100%)	0	0	100	100
8	PP1	14/16 (88%)	14 (100%)	0	0	100	100
8	uP1	14/16 (88%)	13 (93%)	1 (7%)	0	100	100
9	MP1	15/17 (88%)	15 (100%)	0	0	100	100
10	QP1	619/906 (68%)	580 (94%)	37 (6%)	2 (0%)	41	76
10	cP1	619/906 (68%)	579 (94%)	38 (6%)	2 (0%)	41	76
10	dP1	619/906 (68%)	580 (94%)	39 (6%)	0	100	100
10	eP1	619/906 (68%)	582 (94%)	36 (6%)	1 (0%)	47	81
10	fP1	619/906 (68%)	584 (94%)	34 (6%)	1 (0%)	47	81
11	RP1	543/896 (61%)	511 (94%)	32 (6%)	0	100	100
11	YP1	543/896 (61%)	504 (93%)	36 (7%)	3 (1%)	25	65
11	ZP1	541/896 (60%)	508 (94%)	31 (6%)	2 (0%)	34	72
11	aP1	541/896 (60%)	499 (92%)	39 (7%)	3 (1%)	25	65
11	bP1	543/896 (61%)	519 (96%)	24 (4%)	0	100	100
12	SP1	568/1625 (35%)	508 (89%)	48 (8%)	12 (2%)	7	38
13	TP1	434/451 (96%)	409 (94%)	25 (6%)	0	100	100
13	hP1	434/451 (96%)	410 (94%)	24 (6%)	0	100	100
13	iP1	434/451 (96%)	410 (94%)	24 (6%)	0	100	100
13	kP1	434/451 (96%)	410 (94%)	24 (6%)	0	100	100
13	lP1	434/451 (96%)	410 (94%)	24 (6%)	0	100	100
13	mP1	434/451 (96%)	410 (94%)	24 (6%)	0	100	100
13	nP1	434/451 (96%)	410 (94%)	24 (6%)	0	100	100
13	oP1	434/451 (96%)	410 (94%)	24 (6%)	0	100	100
13	pP1	434/451 (96%)	410 (94%)	24 (6%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
13	qP1	434/451 (96%)	410 (94%)	24 (6%)	0	100	100
13	rP1	434/451 (96%)	410 (94%)	24 (6%)	0	100	100
13	sP1	434/451 (96%)	410 (94%)	24 (6%)	0	100	100
13	tP1	434/451 (96%)	410 (94%)	24 (6%)	0	100	100
13	wP1	434/451 (96%)	410 (94%)	24 (6%)	0	100	100
14	UP1	559/1019 (55%)	516 (92%)	41 (7%)	2 (0%)	34	72
15	VP1	563/666 (84%)	520 (92%)	39 (7%)	4 (1%)	22	62
15	WP1	563/666 (84%)	521 (92%)	39 (7%)	3 (0%)	29	68
16	gP1	17/19 (90%)	17 (100%)	0	0	100	100
17	jP1	369/375 (98%)	354 (96%)	15 (4%)	0	100	100
All	All	14792/20001 (74%)	13891 (94%)	866 (6%)	35 (0%)	50	81

5 of 35 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
12	SP1	513	VAL
12	SP1	1460	VAL
12	SP1	1461	ASN
12	SP1	1510	SER
12	SP1	1533	THR

### 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	
10	QP1	561/798 (70%)	543 (97%)	18 (3%)	39	61
10	cP1	561/798 (70%)	558 (100%)	3 (0%)	88	93
10	dP1	561/798 (70%)	554 (99%)	7 (1%)	71	84
10	eP1	561/798 (70%)	556 (99%)	5 (1%)	78	87
10	fP1	561/798 (70%)	547 (98%)	14 (2%)	47	68
11	RP1	507/824 (62%)	502 (99%)	5 (1%)	76	86

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
11	YP1	507/824 (62%)	504 (99%)	3 (1%)	86	92
11	ZP1	506/824 (61%)	500 (99%)	6 (1%)	71	84
11	aP1	505/824 (61%)	505 (100%)	0	100	100
11	bP1	507/824 (62%)	506 (100%)	1 (0%)	93	96
12	SP1	527/1471 (36%)	524 (99%)	3 (1%)	86	92
13	TP1	387/400 (97%)	368 (95%)	19 (5%)	25	51
13	hP1	387/400 (97%)	368 (95%)	19 (5%)	25	51
13	iP1	387/400 (97%)	368 (95%)	19 (5%)	25	51
13	kP1	387/400 (97%)	368 (95%)	19 (5%)	25	51
13	lP1	387/400 (97%)	368 (95%)	19 (5%)	25	51
13	mP1	387/400 (97%)	368 (95%)	19 (5%)	25	51
13	nP1	387/400 (97%)	368 (95%)	19 (5%)	25	51
13	oP1	387/400 (97%)	368 (95%)	19 (5%)	25	51
13	pP1	387/400 (97%)	368 (95%)	19 (5%)	25	51
13	qP1	387/400 (97%)	368 (95%)	19 (5%)	25	51
13	rP1	387/400 (97%)	368 (95%)	19 (5%)	25	51
13	sP1	387/400 (97%)	368 (95%)	19 (5%)	25	51
13	tP1	387/400 (97%)	368 (95%)	19 (5%)	25	51
13	wP1	387/400 (97%)	368 (95%)	19 (5%)	25	51
14	UP1	523/933 (56%)	523 (100%)	0	100	100
15	VP1	518/595 (87%)	497 (96%)	21 (4%)	30	55
15	WP1	518/595 (87%)	500 (96%)	18 (4%)	36	60
17	jP1	314/318 (99%)	314 (100%)	0	100	100
All	All	13155/17622 (75%)	12785 (97%)	370 (3%)	46	65

5 of 370 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
13	nP1	231	LEU
13	qP1	221	GLN
13	oP1	26	CYS
13	pP1	56	ASP
13	rP1	80	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

## 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.

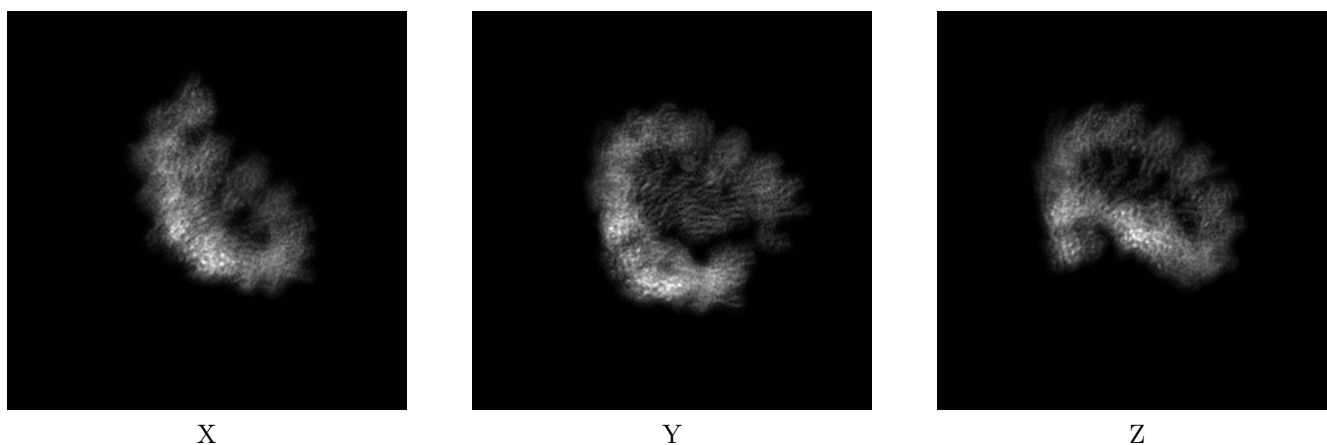
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-10491. These allow visual inspection of the internal detail of the map and identification of artifacts.

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

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

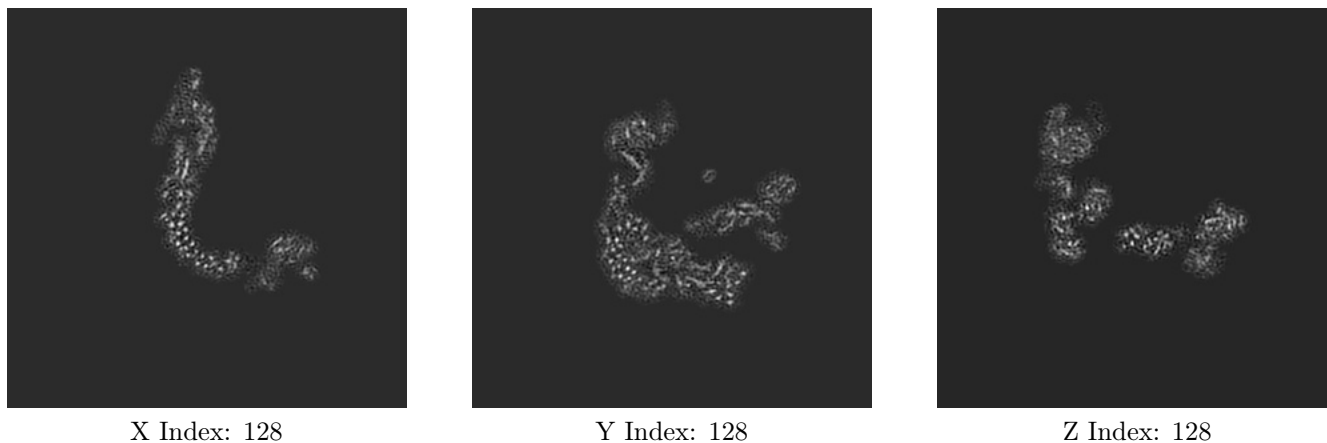
#### 6.1.1 Primary map



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

### 6.2 Central slices [i](#)

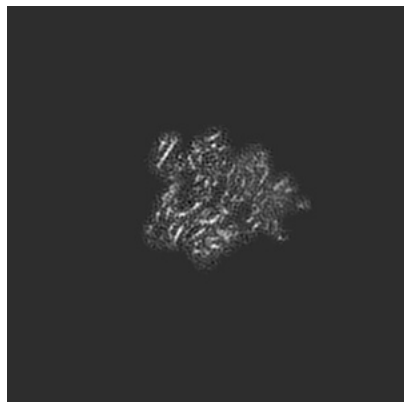
#### 6.2.1 Primary map



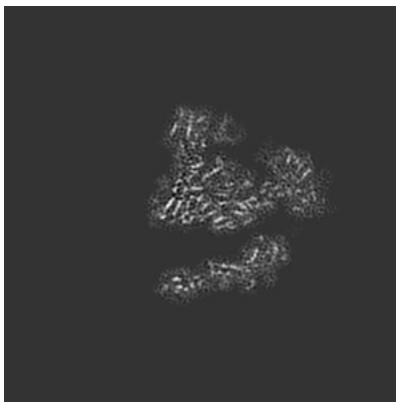
The images above show central slices of the map in three orthogonal directions.

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

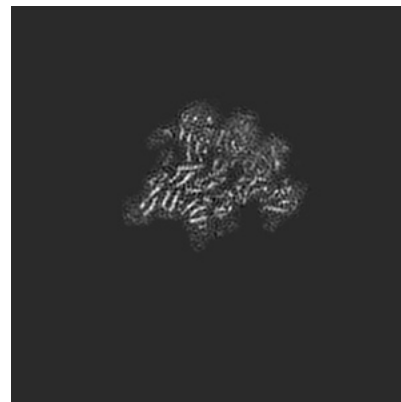
### 6.3.1 Primary map



X Index: 81



Y Index: 109

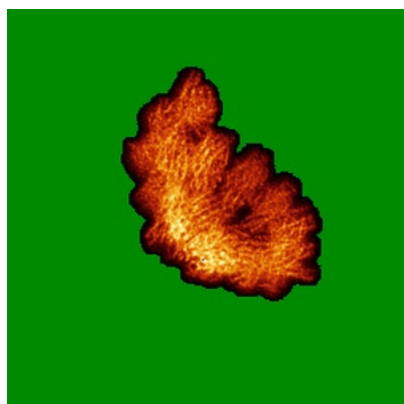


Z Index: 94

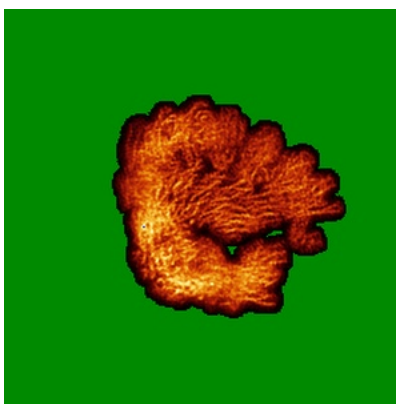
The images above show the largest variance slices of the map in three orthogonal directions.

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

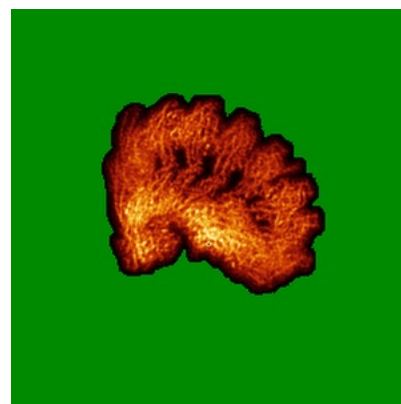
### 6.4.1 Primary map



X



Y

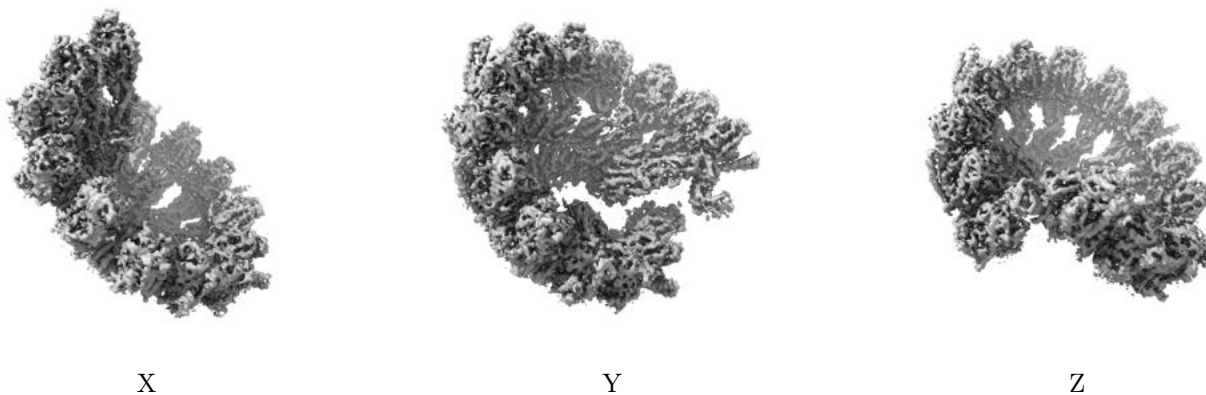


Z

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

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

### 6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.04. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

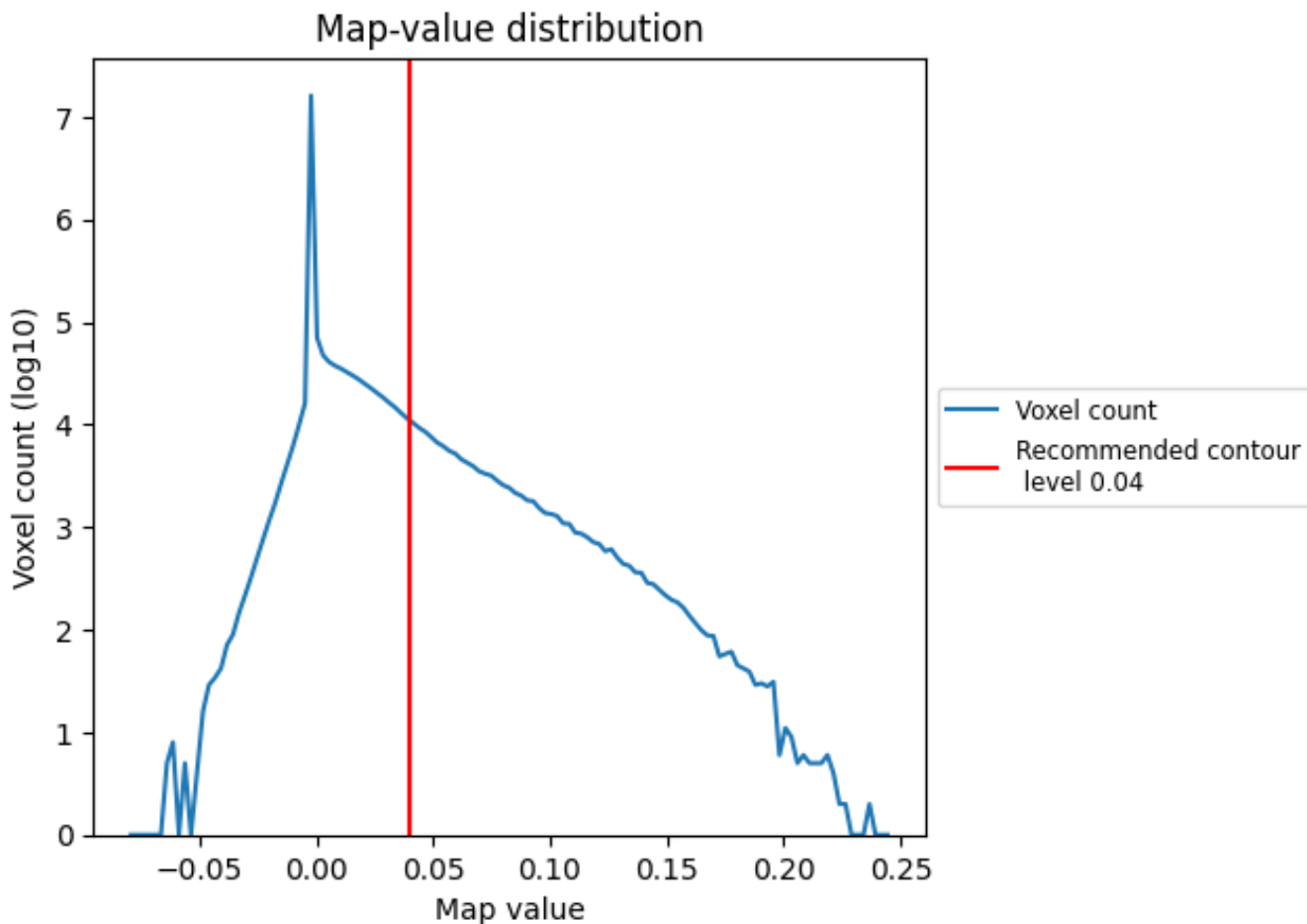
## 6.6 Mask visualisation [i](#)

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

## 7 Map analysis [i](#)

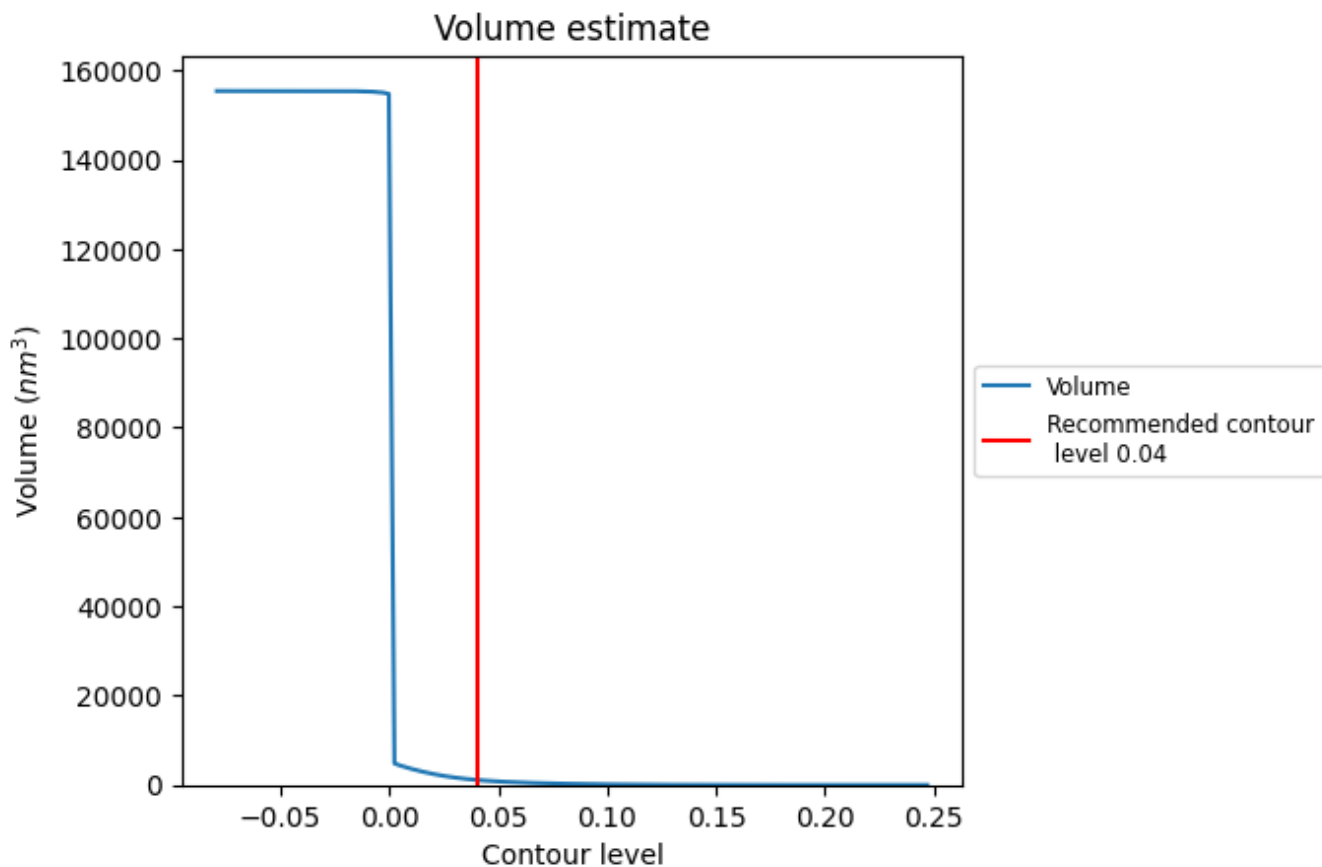
This section contains the results of statistical analysis of the map.

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



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

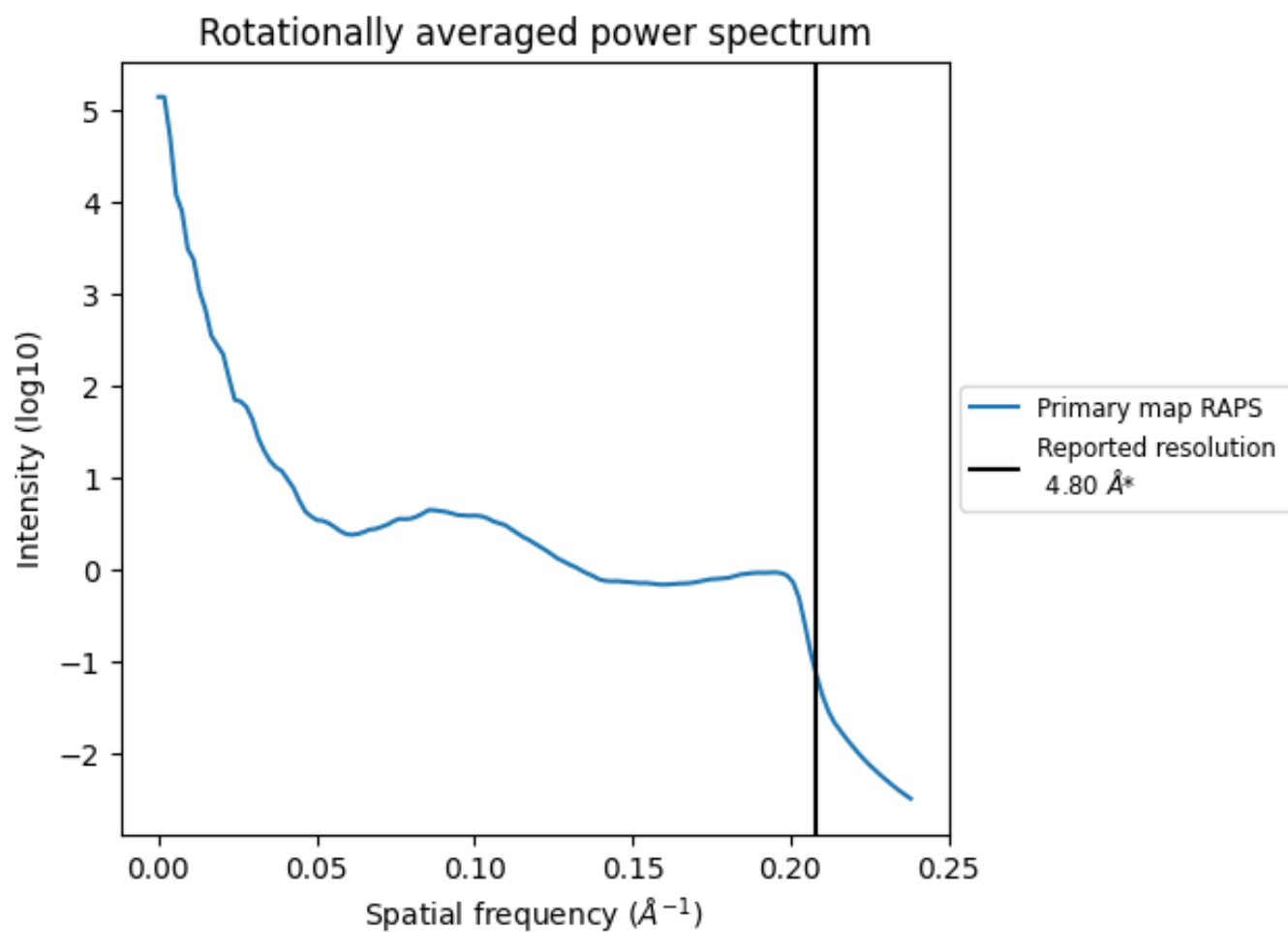
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1128 nm<sup>3</sup>; this corresponds to an approximate mass of 1019 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 0.208 Å<sup>-1</sup>



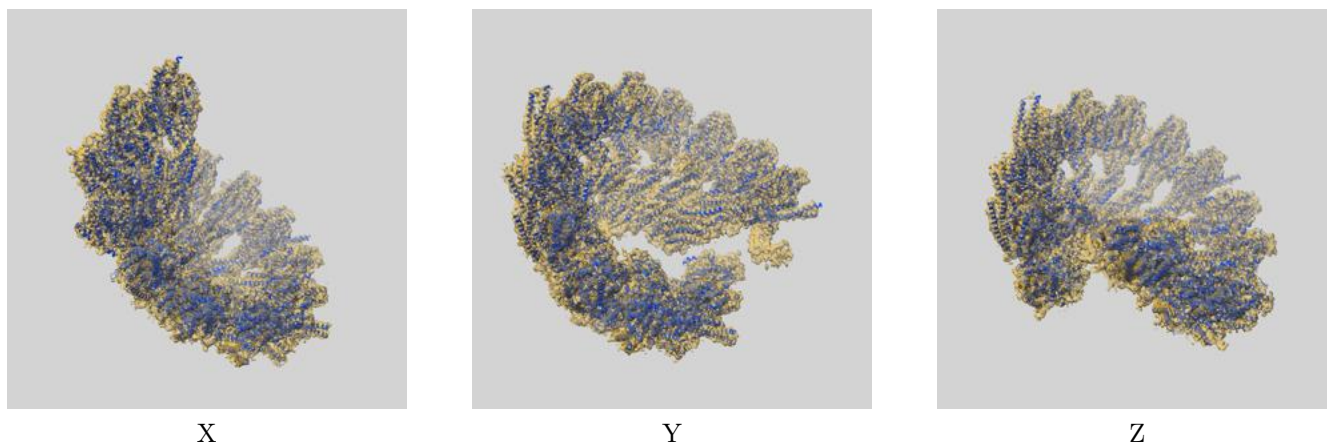
## 8 Fourier-Shell correlation

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

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

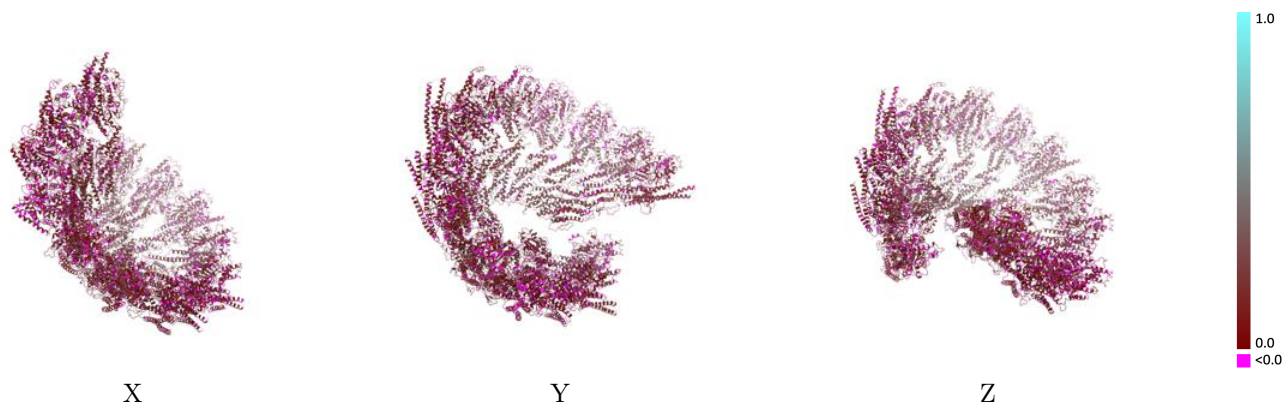
This section contains information regarding the fit between EMDB map EMD-10491 and PDB model 6TF9. Per-residue inclusion information can be found in section 3 on page 9.

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



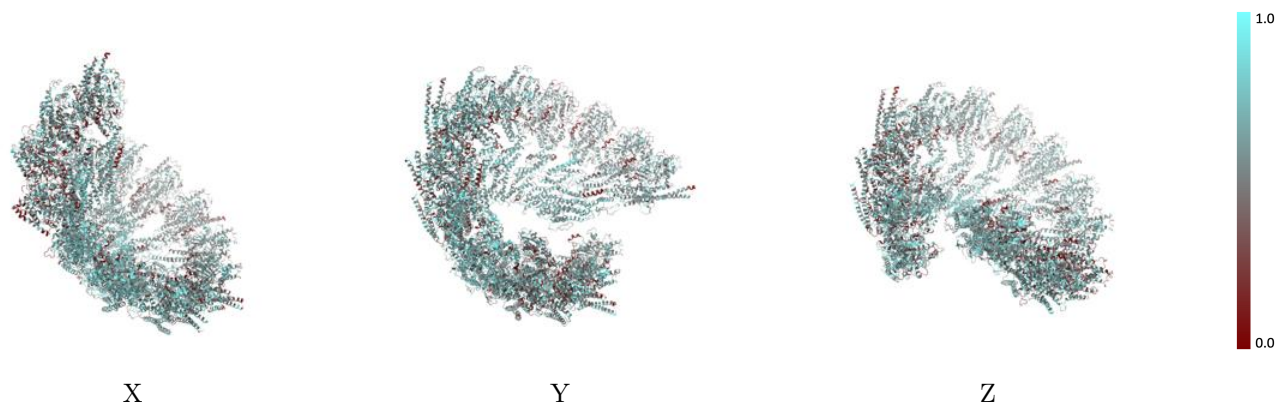
The images above show the 3D surface view of the map at the recommended contour level 0.04 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



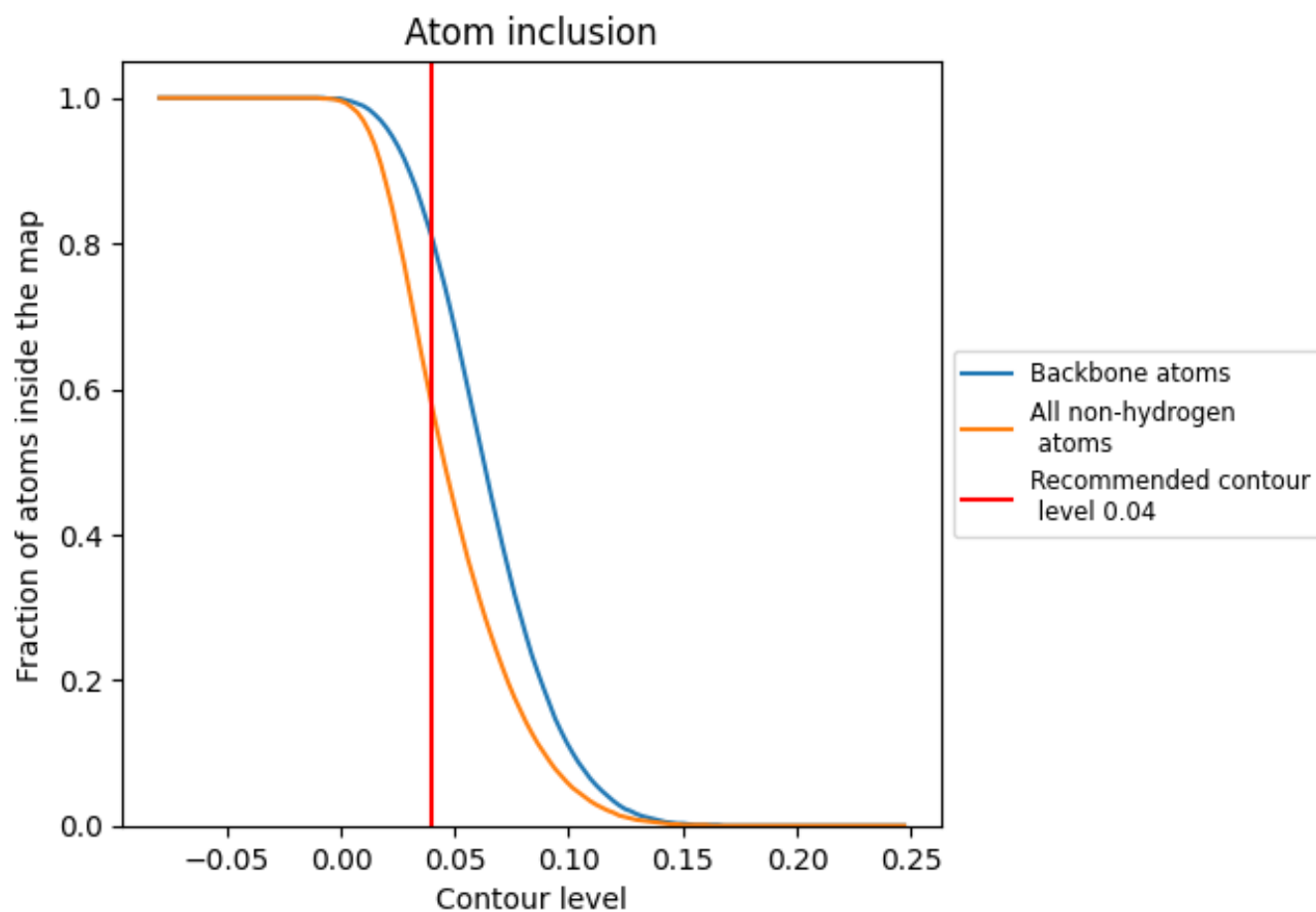
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions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

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



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.04).







































































## 9.4 Atom inclusion [i](#)



At the recommended contour level, 81% of all backbone atoms, 58% 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 (0.04) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.5770	 0.1380
AP1	 0.8430	 0.2100
CP1	 0.8790	 0.2540
DP1	 0.9420	 0.2650
EP1	 0.9050	 0.2110
FP1	 0.9450	 0.2230
GP1	 0.8160	 0.2090
HP1	 0.8330	 0.2060
IP1	 0.8940	 0.2410
JP1	 0.8450	 0.2340
KP1	 0.9260	 0.2570
LP1	 0.8950	 0.2290
MP1	 0.8950	 0.2170
NP1	 0.9210	 0.2450
OP1	 0.9010	 0.2680
PP1	 0.8640	 0.2350
QP1	 0.5930	 0.1340
RP1	 0.6190	 0.1540
SP1	 0.6060	 0.1500
TP1	 0.5360	 0.1180
UP1	 0.6380	 0.1760
VP1	 0.5500	 0.1180
WP1	 0.6290	 0.1740
XP1	 0.9550	 0.2430
YP1	 0.6190	 0.1450
ZP1	 0.6460	 0.1630
aP1	 0.6280	 0.1690
bP1	 0.6350	 0.1690
cP1	 0.5670	 0.1260
dP1	 0.5800	 0.1420
eP1	 0.6170	 0.1710
fP1	 0.5670	 0.1340
gP1	 0.8960	 0.2780
hP1	 0.5550	 0.1240
iP1	 0.4690	 0.0950



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Chain	Atom inclusion	Q-score
jP1	 0.5520	 0.1690
kP1	 0.5030	 0.1020
lP1	 0.5580	 0.1080
mP1	 0.5600	 0.1260
nP1	 0.5050	 0.1010
oP1	 0.5480	 0.1340
pP1	 0.5920	 0.1340
qP1	 0.5680	 0.1230
rP1	 0.4530	 0.0970
sP1	 0.4730	 0.0890
tP1	 0.5330	 0.1160
uP1	 0.7530	 0.1820
vP1	 0.9440	 0.2670
wP1	 0.5330	 0.1430