



wwPDB EM Validation Summary Report ⓘ

Aug 4, 2025 – 06:59 PM EDT

PDB ID : 9D2F / pdb_00009d2f
EMDB ID : EMD-46494
Title : 3D structure and atomic model of RS3 of mouse respiratory cilia
Authors : Yanhe, Z.; Xuewu, Z.; Daniela, N.
Deposited on : 2024-08-08
Resolution : 4.70 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.dev126
MolProbity : 4-5-2 with Phenix2.0rc1
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.45.1

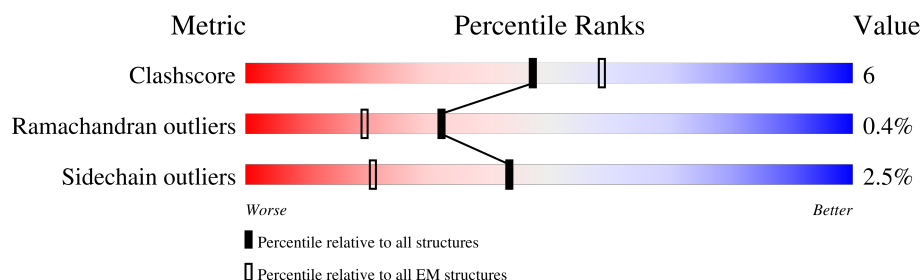
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

ELECTRON MICROSCOPY

The reported resolution of this entry is 4.70 Å.

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



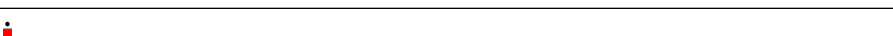
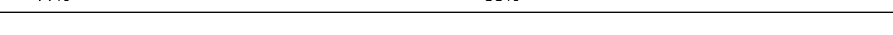
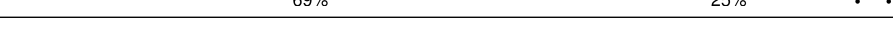
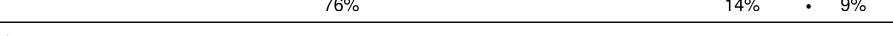
Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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

Mol	Chain	Length	Quality of chain
1	A	1894	
2	B	340	
2	C	340	
3	H	321	
4	N	783	
5	O	377	
5	R	377	
6	P	258	

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Mol	Chain	Length	Quality of chain
6	Q	258	
7	S	172	
8	U	4250	
9	W	1249	
9	X	1249	
10	Y	1682	
11	Z	1843	
12	T	4144	
13	I	170	
14	J	1252	
15	K	1299	
16	L	471	
17	M	363	
18	E	334	
19	F	500	
20	V	93	
21	a	536	
22	b	401	
23	c	520	
24	D	723	
24	G	723	

2 Entry composition [i](#)

There are 25 unique types of molecules in this entry. The entry contains 184242 atoms, of which 92030 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 Adenylate kinase 9.

Mol	Chain	Residues	Atoms						AltConf	Trace
1	A	1663	Total	C	H	N	O	S	0	0
			27190	8668	13598	2273	2587	64		

- Molecule 2 is a protein called Leucine-rich repeat-containing protein 23.

Mol	Chain	Residues	Atoms						AltConf	Trace
2	B	288	Total	C	H	N	O	S	0	0
			4678	1462	2348	408	452	8		
2	C	289	Total	C	H	N	O	S	0	0
			4693	1467	2354	409	455	8		

- Molecule 3 is a protein called Serine/threonine/tyrosine interacting-like 1.

Mol	Chain	Residues	Atoms						AltConf	Trace
3	H	285	Total	C	H	N	O	S	0	0
			4719	1521	2366	403	415	14		

- Molecule 4 is a protein called Cilia- and flagella-associated protein 91.

Mol	Chain	Residues	Atoms						AltConf	Trace
4	N	292	Total	C	H	N	O	S	0	0
			4857	1508	2433	427	479	10		

- Molecule 5 is a protein called Actin, aortic smooth muscle.

Mol	Chain	Residues	Atoms						AltConf	Trace
5	O	368	Total	C	H	N	O	S	0	0
			5724	1822	2847	486	548	21		
5	R	370	Total	C	H	N	O	S	0	0
			5748	1829	2859	488	551	21		

- Molecule 6 is a protein called Axonemal dynein light intermediate polypeptide 1.

Mol	Chain	Residues	Atoms						AltConf	Trace
6	P	202	Total	C	H	N	O	S	0	0
			3334	1025	1675	301	325	8		
6	Q	198	Total	C	H	N	O	S	0	0
			3278	1008	1646	297	319	8		

- Molecule 7 is a protein called Centrin-2.

Mol	Chain	Residues	Atoms						AltConf	Trace
7	S	147	Total	C	H	N	O	S	0	0
			2372	741	1185	192	247	7		

- Molecule 8 is a protein called Dynein axonemal heavy chain 1.

Mol	Chain	Residues	Atoms						AltConf	Trace
8	U	813	Total	C	H	N	O	S	0	0
			13198	4207	6594	1103	1253	41		

- Molecule 9 is a protein called Cilia- and flagella-associated protein 57.

Mol	Chain	Residues	Atoms						AltConf	Trace
9	W	207	Total	C	H	N	O	S	0	0
			3622	1112	1842	327	335	6		
9	X	227	Total	C	H	N	O	S	0	0
			3937	1205	2005	355	365	7		

- Molecule 10 is a protein called Cilia- and flagella-associated protein 43.

Mol	Chain	Residues	Atoms						AltConf	Trace
10	Y	39	Total	C	H	N	O	S	0	0
			629	192	317	55	63	2		

- Molecule 11 is a protein called Cilia- and flagella-associated protein 44.

Mol	Chain	Residues	Atoms						AltConf	Trace
11	Z	44	Total	C	H	N	O	S	0	0
			751	229	382	70	66	4		

- Molecule 12 is a protein called Dynein, axonemal, heavy chain 6.

Mol	Chain	Residues	Atoms						AltConf	Trace
12	T	517	Total	C	H	N	O	S	0	0
			8605	2750	4334	728	774	19		

- Molecule 13 is a protein called MORN repeat-containing protein 5.

Mol	Chain	Residues	Atoms						AltConf	Trace
13	I	165	Total	C	H	N	O	S	0	0
			2663	877	1288	235	253	10		

- Molecule 14 is a protein called Cilia- and flagella-associated protein 61.

Mol	Chain	Residues	Atoms						AltConf	Trace
14	J	1145	Total	C	H	N	O	S	0	0
			18417	5974	9162	1543	1691	47		

- Molecule 15 is a protein called Cilia- and flagella-associated protein 251.

Mol	Chain	Residues	Atoms						AltConf	Trace
15	K	905	Total	C	H	N	O	S	0	0
			14317	4622	7129	1182	1341	43		

- Molecule 16 is a protein called Tetratricopeptide repeat protein 29.

Mol	Chain	Residues	Atoms						AltConf	Trace
16	L	384	Total	C	H	N	O	S	0	0
			6112	1954	3005	532	602	19		

- Molecule 17 is a protein called Zinc finger, MYND domain containing 12.

Mol	Chain	Residues	Atoms						AltConf	Trace
17	M	345	Total	C	H	N	O	S	0	0
			5500	1755	2741	463	525	16		

- Molecule 18 is a protein called Malate dehydrogenase, cytoplasmic.

Mol	Chain	Residues	Atoms						AltConf	Trace
18	E	334	Total	C	H	N	O	S	0	0
			5194	1634	2629	429	490	12		

- Molecule 19 is a protein called Putative malate dehydrogenase 1B.

Mol	Chain	Residues	Atoms						AltConf	Trace
19	F	459	Total	C	H	N	O	S	0	0
			7290	2327	3661	602	678	22		

- Molecule 20 is a protein called UPF0728 protein C10orf53 homolog.

Mol	Chain	Residues	Atoms						AltConf	Trace
20	V	92	Total	C	H	N	O	S	0	0
			1433	459	710	121	141	2		

- Molecule 21 is a protein called A kinase (PRKA) anchor protein 14.

Mol	Chain	Residues	Atoms						AltConf	Trace
21	a	124	Total	C	H	N	O	S	0	0
			2133	702	1062	182	186	1		

- Molecule 22 is a protein called cAMP-dependent protein kinase type II-alpha regulatory subunit.

Mol	Chain	Residues	Atoms						AltConf	Trace
22	b	52	Total	C	H	N	O	S	0	0
			837	269	415	71	81	1		

- Molecule 23 is a protein called Ciliogenesis-associated TTC17-interacting protein.

Mol	Chain	Residues	Atoms						AltConf	Trace
23	c	73	Total	C	H	N	O		0	0
			1220	402	607	106	105			

- Molecule 24 is a protein called Adenylate kinase 7.

Mol	Chain	Residues	Atoms						AltConf	Trace
24	D	678	Total	C	H	N	O	S	0	0
			10879	3476	5413	914	1053	23		
24	G	681	Total	C	H	N	O	S	0	0
			10910	3486	5423	917	1061	23		

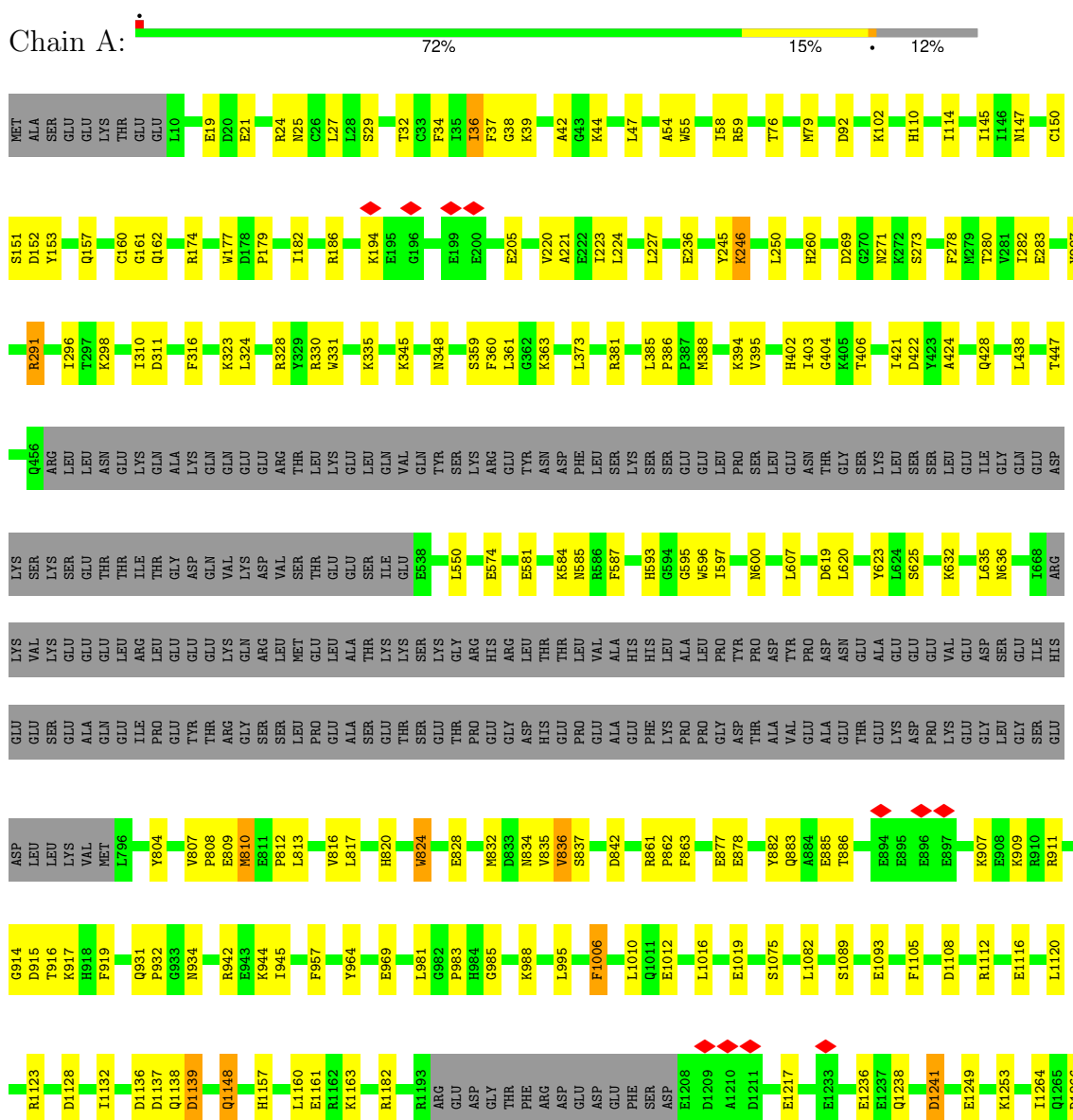
- Molecule 25 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		AltConf
25	M	2	Total	Zn	0
			2	2	

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.

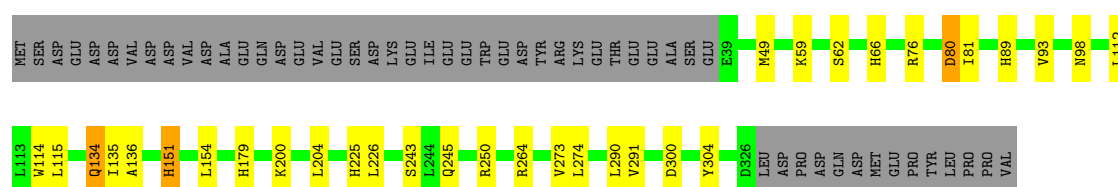
• Molecule 1: Adenylate kinase 9





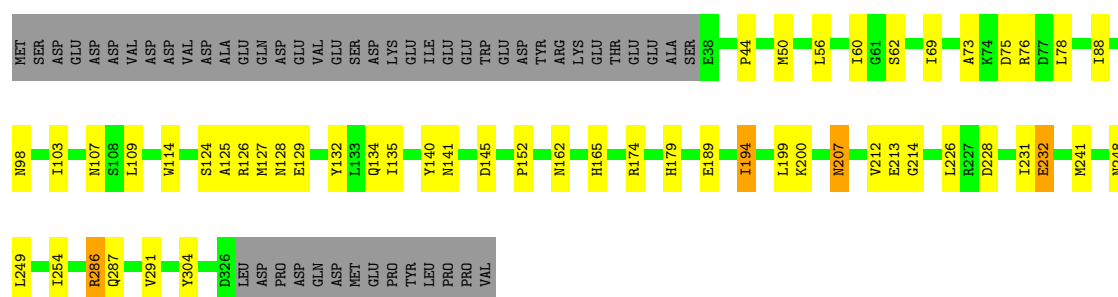
- Molecule 2: Leucine-rich repeat-containing protein 23

Chain B: 75% 9% 15%



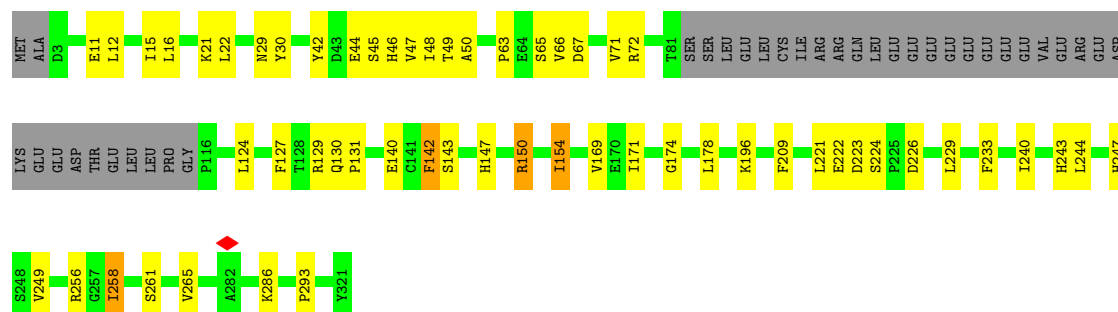
- Molecule 2: Leucine-rich repeat-containing protein 23

Chain C: 69% 14% 15%



- Molecule 3: Serine/threonine/tyrosine interacting-like 1

Chain H: 71% 17% 11%

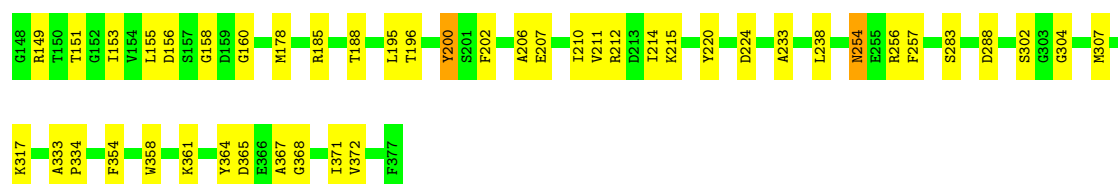


- Molecule 4: Cilia- and flagella-associated protein 91

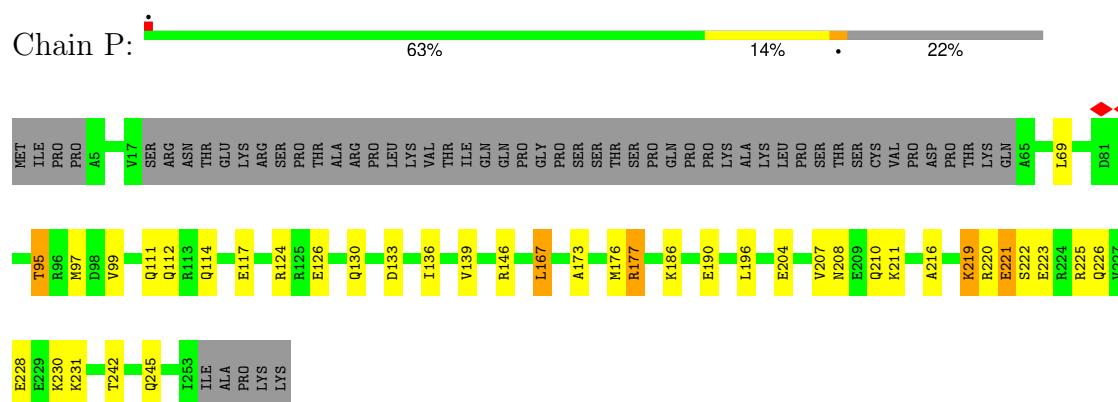
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R684	F507
R685	Q508
Y686	M509
	M510
	L519
V693	R526
L696	
S699	H529
I702	A530
P703	L531
	Q532
	E533
D708	T534
	D535
E712	V538
N716	K539
R719	R553
	M565
W732	D569
T733	
E734	L576
T735	A576
	D577
V741	M578
L745	F579
E751	L582
	S583
S758	A584
L759	E585
D760	L586
S761	W587
	R588
P764	L589
T765	
V766	R593
SER	R594
VAL	L595
SER	
LVS	F598
THR	
SER	R617
THR	
I	I
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GLN	
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GLU	
GLY	E671
GLU	E672

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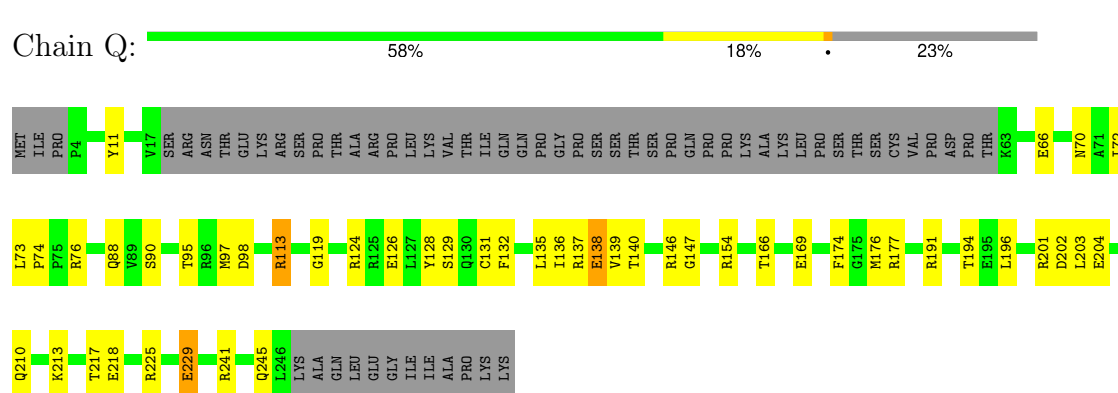
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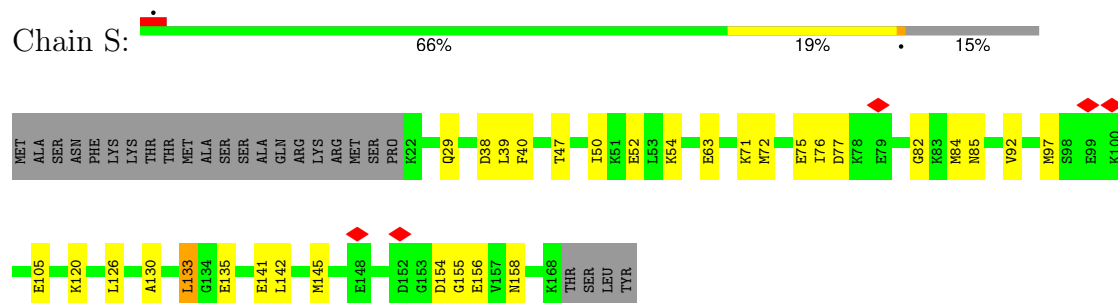
- Molecule 6: Axonemal dynein light intermediate polypeptide 1



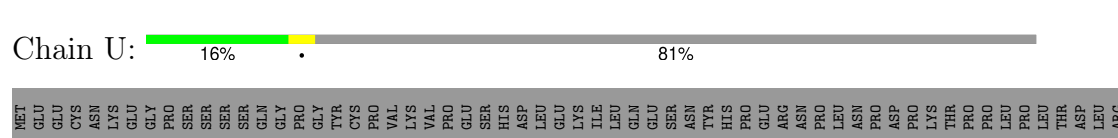
- Molecule 6: Axonemal dynein light intermediate polypeptide 1



- Molecule 7: Centrin-2



- Molecule 8: Dynein axonemal heavy chain 1

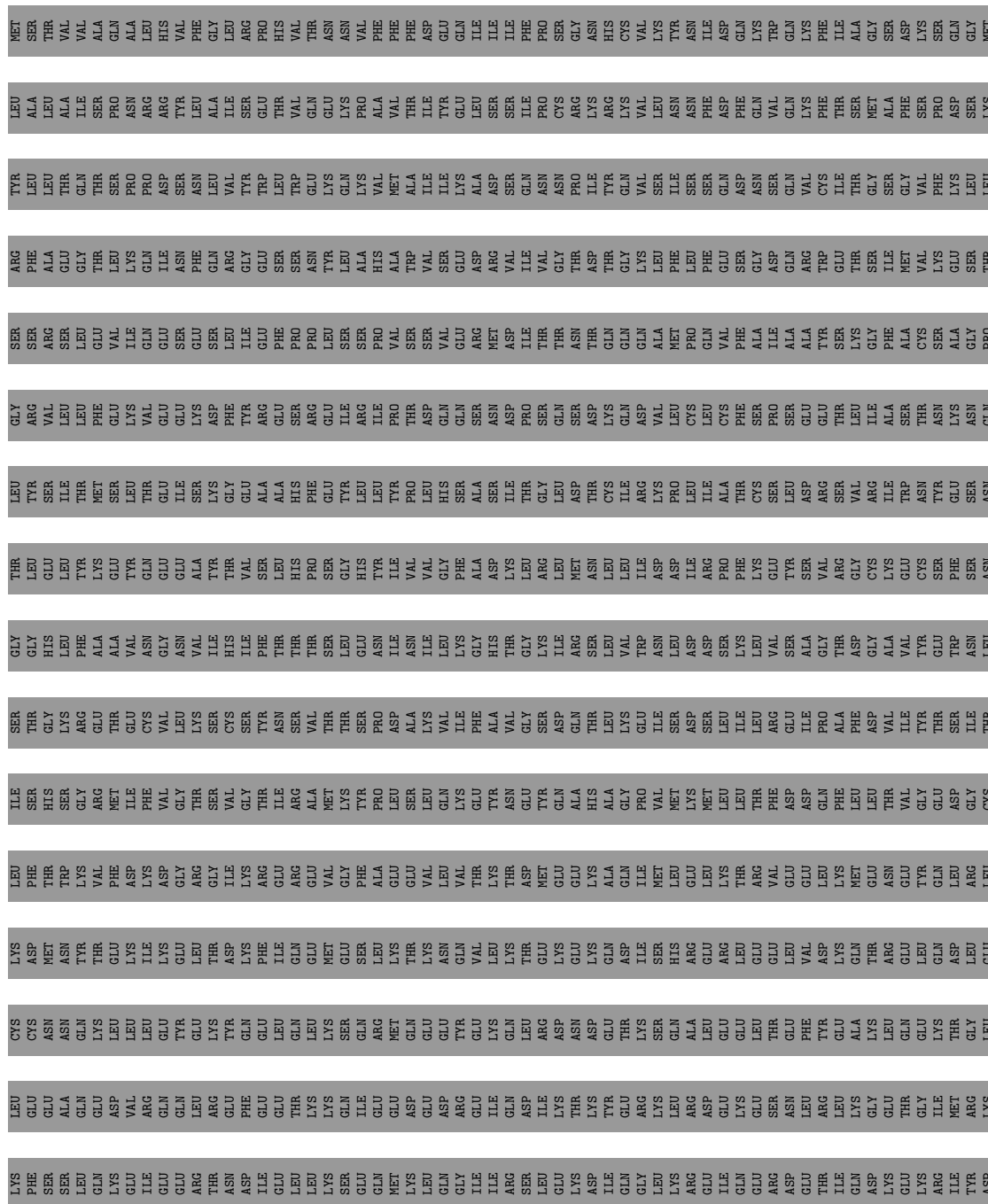


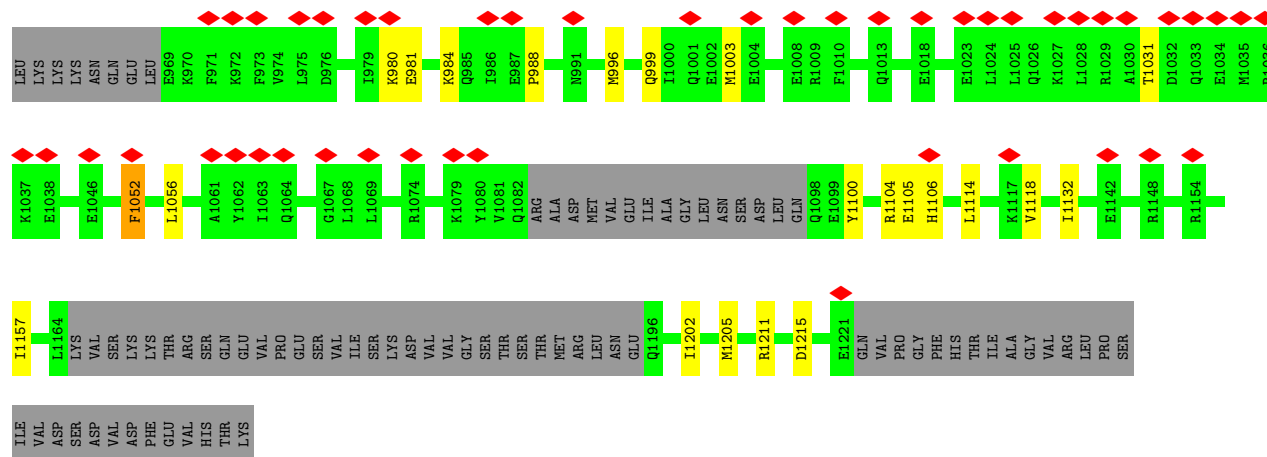
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VAL	PRO	CYS	ALA	VAL	VAL	PHE	ILE	ASP	VAL	THR	GLY	THR	ASP	GLY	VAL	F450	S451	V452	N465	V471	R491	P492	F493	V494	L498	V501	V508	M511	K520	Y521	S522	F527	Q537	M540	F541	D544	S548	T549	L550	M554	M585	K589	L592	Q593	D594	F610	W627	L661	N668	L669	I695								
VAL	PRO	CYS	ALA	VAL	VAL	PHE	ILE	ASP	VAL	THR	GLY	THR	ASP	GLY	VAL	L700	L710	M726	P727	P728	L729	Q730	Y731	Y732	E735	Y736	K737	N743	L751	Y754	Q755	C758	P759	E762	F763	V764	R765	E766	V767	V768	L772	K775	F791	Y792	I793	K805	R806	M813	A818	I828	S836	ARG	LYS	ILE	TYR	GLU	LYS	PRO	
ASN	SER	ILE	GLU	GLY	VAL	ALA	GLU	LEU	ALA	GLU	LEU	TRP	MET	LYS	GLY	ASN	SER	E861	K862	L866	E867	E868	R869	I870	V879	M880	L887	T888	M911	VAL	ARG	ASN	GLN	GLN	HIS	VAL	GLU	MET	ASP	GLY	GLU	GLY	ASN	LYS	PHE	ASN	ASN	PHE	GLN	TYR	GLU	LYS	LEU						
GLY	GLY	LEU	GLN	VAL	VAL	ALA	GLU	LEU	ALA	ALA	ALA	TRP	THR	THR	ILE	GLY	PRO	E861	K862	L866	E867	E868	R869	I870	V879	M880	L887	T888	M911	VAL	ARG	ASN	GLN	GLN	HIS	VAL	GLU	MET	ASP	GLY	GLU	GLY	ASN	LYS	PHE	ASN	ASN	PHE	GLN	TYR	GLU	LYS	LEU						
SER	ARG	MET	VAL	LYS	GLU	PHE	GLU	VAL	VAL	ALA	GLU	TRP	THR	THR	ILE	GLY	PRO	E861	K862	L866	E867	E868	R869	I870	V879	M880	L887	T888	M911	VAL	ARG	ASN	GLN	GLN	HIS	VAL	GLU	MET	ASP	GLY	GLU	GLY	ASN	LYS	PHE	ASN	ASN	PHE	GLN	TYR	GLU	LYS	LEU						
ILE	PRO	ALA	CYS	GLN	GLU	VAL	VAL	ASP	HIS	ALA	ASP	THR	THR	THR	ILE	GLY	PRO	E861	K862	L866	E867	E868	R869	I870	V879	M880	L887	T888	M911	VAL	ARG	ASN	GLN	GLN	HIS	VAL	GLU	MET	ASP	GLY	GLU	GLY	ASN	LYS	PHE	ASN	ASN	PHE	GLN	TYR	GLU	LYS	LEU						
LEU	GLY	MET	ASN	LEU	GLN	ASP	HIS	ASP	HIS	ILE	VAL	VAL	THR	THR	ILE	GLY	PRO	E861	K862	L866	E867	E868	R869	I870	V879	M880	L887	T888	M911	VAL	ARG	ASN	GLN	GLN	HIS	VAL	GLU	MET	ASP	GLY	GLU	GLY	ASN	LYS	PHE	ASN	ASN	PHE	GLN	TYR	GLU	LYS	LEU						
SER	GLN	LEU	LEU	ASP	GLN	HIS	ILE	VAL	VAL	VAL	VAL	THR	THR	THR	ILE	GLY	PRO	E861	K862	L866	E867	E868	R869	I870	V879	M880	L887	T888	M911	VAL	ARG	ASN	GLN	GLN	HIS	VAL	GLU	MET	ASP	GLY	GLU	GLY	ASN	LYS	PHE	ASN	ASN	PHE	GLN	TYR	GLU	LYS	LEU						
GLY	ASP	ILE	THR	GLY	GLN	PRO	THR	VAL	VAL	VAL	VAL	THR	THR	THR	ILE	GLY	PRO	E861	K862	L866	E867	E868	R869	I870	V879	M880	L887	T888	M911	VAL	ARG	ASN	GLN	GLN	HIS	VAL	GLU	MET	ASP	GLY	GLU	GLY	ASN	LYS	PHE	ASN	ASN	PHE	GLN	TYR	GLU	LYS	LEU						
LEU	SER	GLY	TYR	LEU	GLY	THR	LYS	THR	THR	THR	THR	THR	THR	THR	ILE	GLY	PRO	E861	K862	L866	E867	E868	R869	I870	V879	M880	L887	T888	M911	VAL	ARG	ASN	GLN	GLN	HIS	VAL	GLU	MET	ASP	GLY	GLU	GLY	ASN	LYS	PHE	ASN	ASN	PHE	GLN	TYR	GLU	LYS	LEU						
MET	TYR	SER	ALA	GLY	GLY	GLY	GLY	VAL	VAL	VAL	VAL	THR	THR	THR	ILE	GLY	PRO	E861	K862	L866	E867	E868	R869	I870	V879	M880	L887	T888	M911	VAL	ARG	ASN	GLN	GLN	HIS	VAL	GLU	MET	ASP	GLY	GLU	GLY	ASN	LYS	PHE	ASN	ASN	PHE	GLN	TYR	GLU	LYS	LEU						
GLY	GLN	VAL	THR	ILE	ALA	GLY	GLY	VAL	VAL	VAL	VAL	THR	THR	THR	ILE	GLY	PRO	E861	K862	L866	E867	E868	R869	I870	V879	M880	L887	T888	M911	VAL	ARG	ASN	GLN	GLN	HIS	VAL	GLU	MET	ASP	GLY	GLU	GLY	ASN	LYS	PHE	ASN	ASN	PHE	GLN	TYR	GLU	LYS	LEU						
VAL	ILE	GLY	VAL	HIS	ALA	LYS	ASP	VAL	VAL	VAL	VAL	THR	THR	THR	ILE	GLY	PRO	E861	K862	L866	E867	E868	R869	I870	V879	M880	L887	T888	M911	VAL	ARG	ASN	GLN	GLN	HIS	VAL	GLU	MET	ASP	GLY	GLU	GLY	ASN	LYS	PHE	ASN	ASN	PHE	GLN	TYR	GLU	LYS	LEU						
LEU	VAL	ILE	THR	PRO	THR	THR	ASP	THR	THR	THR	THR	THR	THR	THR	ILE	GLY	PRO	E861	K862	L866	E867	E868	R869	I870	V879	M880	L887	T888	M911	VAL	ARG	ASN	GLN	GLN	HIS	VAL	GLU	MET	ASP	GLY	GLU	GLY	ASN	LYS	PHE	ASN	ASN	PHE	GLN	TYR	GLU	LYS	LEU						
MET	ALA	MET	GLY	PHE	PHE	LYS	GLY	THR	THR	THR	THR	THR	THR	THR	ILE	GLY	PRO	E861	K862	L866	E867	E868	R869	I870	V879	M880	L887	T888	M911	VAL	ARG	ASN	GLN	GLN	HIS	VAL	GLU	MET	ASP	GLY	GLU	GLY	ASN	LYS	PHE	ASN	ASN	PHE	GLN	TYR	GLU	LYS	LEU						
VAL	PRO	SER	CYS	ALA	VAL	PHE	ILE	ASP	VAL	VAL	VAL	THR	THR	THR	ILE	GLY	PRO	E861	K862	L866	E867	E868	R869	I870	V879	M880	L887	T888	M911	VAL	ARG	ASN	GLN	GLN	HIS	VAL	GLU	MET	ASP	GLY	GLU	GLY	ASN	LYS	PHE	ASN	ASN	PHE	GLN	TYR	GLU	LYS	LEU						
ILE	THR	THR	THR	PHE	LYS	LEU	SER	LEU	THR	GLY	THR	THR	THR	THR	ILE	GLY	PRO	E861	K862	L866	E867	E868	R869	I870	V879	M880	L887	T888	M911	VAL	ARG	ASN	GLN	GLN	HIS	VAL	GLU	MET	ASP	GLY	GLU	GLY	ASN	LYS	PHE	ASN	ASN	PHE	GLN	TYR	GLU	LYS	LEU						



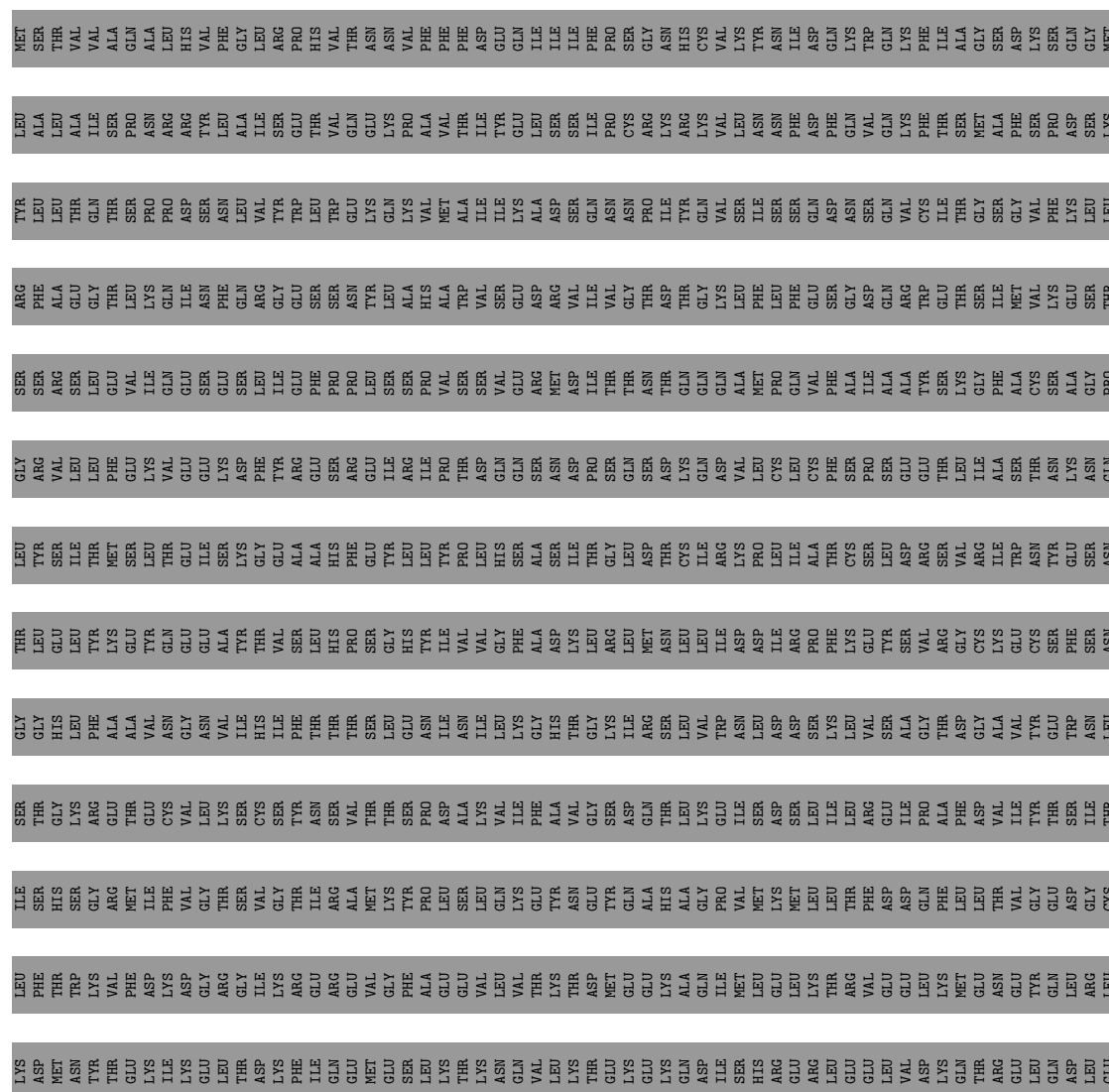


- Molecule 9: Cilia- and flagella-associated protein 57





• Molecule 9: Cilia- and flagella-associated protein 57



- Molecule 10: Cilia- and flagella-associated protein 43

Chain Y:

[illegible]

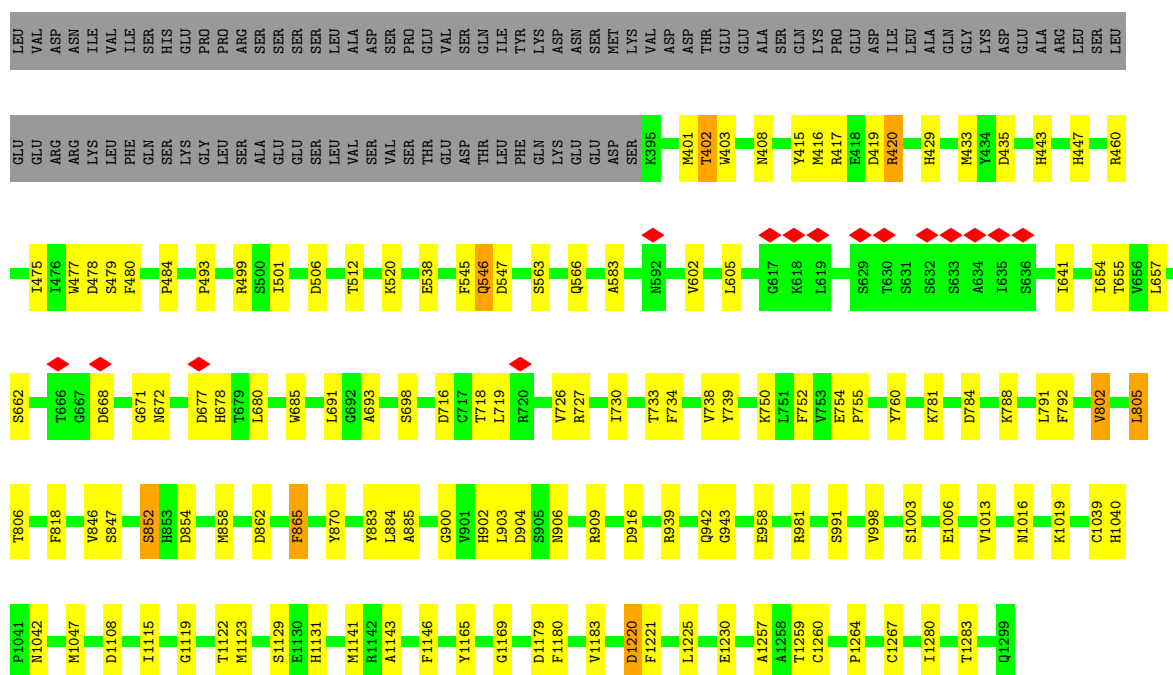






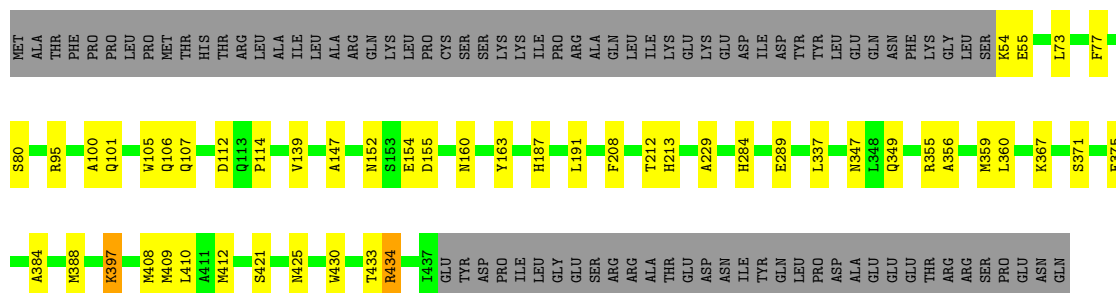






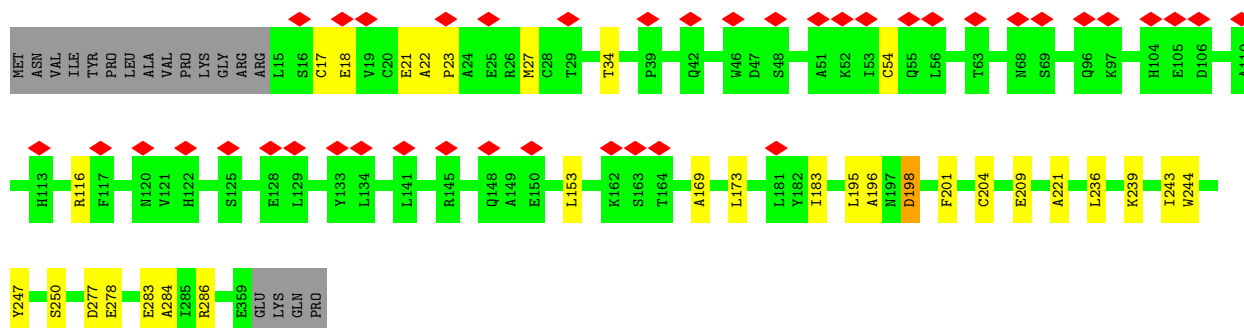
• Molecule 16: Tetratricopeptide repeat protein 29

Chain L: 71% 10% 18%



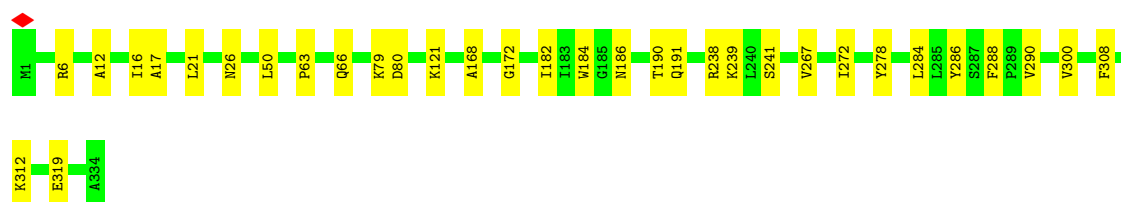
• Molecule 17: Zinc finger, MYND domain containing 12

Chain M: 11% 87% 8% 5%



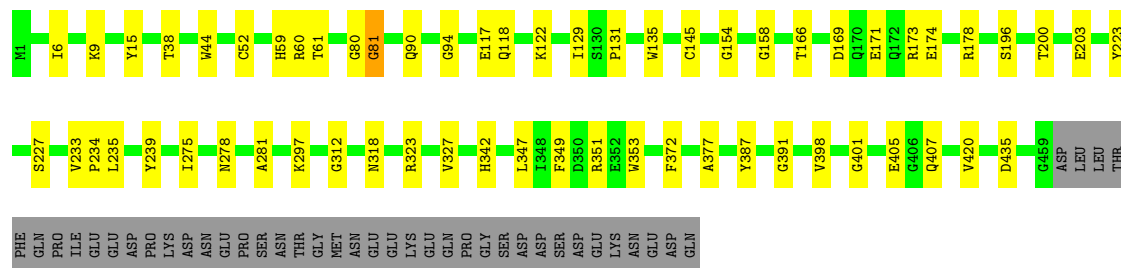
• Molecule 18: Malate dehydrogenase, cytoplasmic

Chain E: 90% 10%



• Molecule 19: Putative malate dehydrogenase 1B

Chain F: 80% 12% 8%



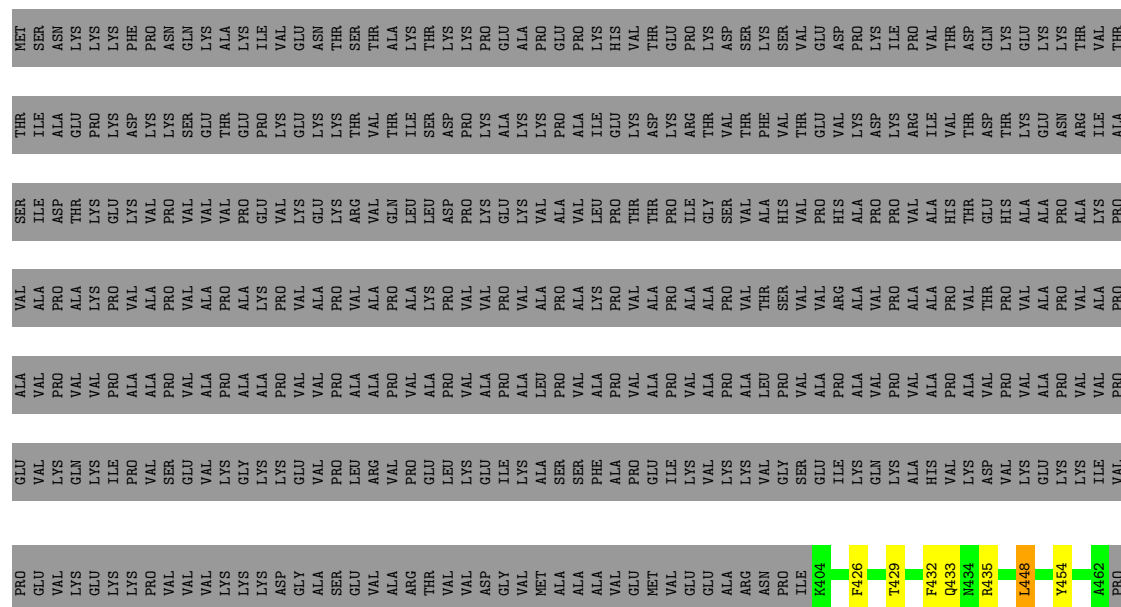
• Molecule 20: UPF0728 protein C10orf53 homolog

Chain V: 80% 18% ..

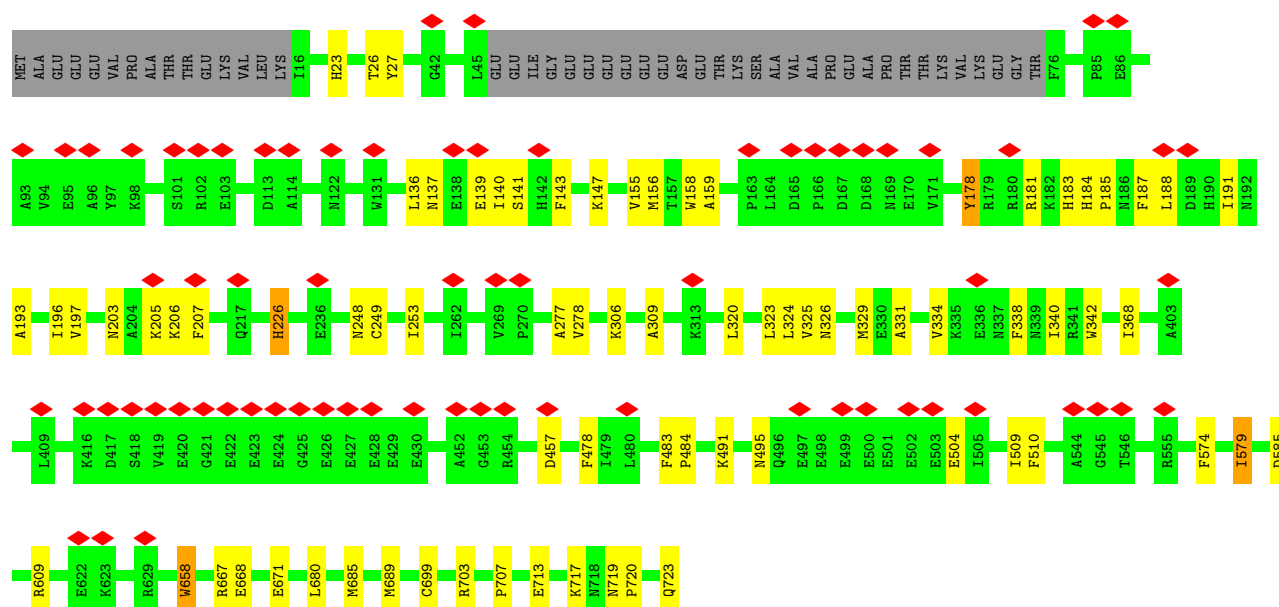


• Molecule 21: A kinase (PRKA) anchor protein 14

Chain a: 20% 77%

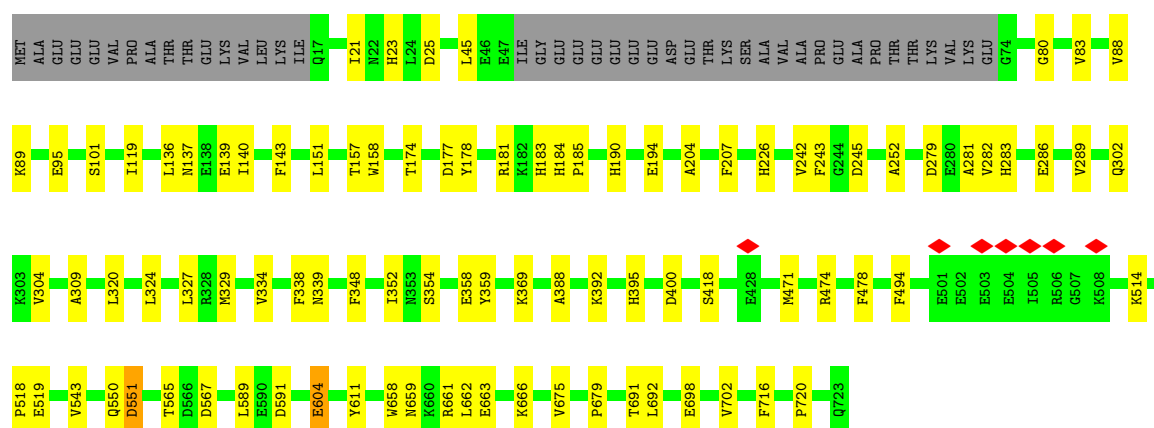


Chain D: 10% 83% 10% 6%



• Molecule 24: Adenylate kinase 7

Chain G: 81% 12% 6%



4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C1	Depositor
Number of particles used	63152	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 ($e^-/\text{\AA}^2$)	60	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	81000	Depositor
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.032	Depositor
Minimum map value	-0.002	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.001	Depositor
Recommended contour level	0.0037	Depositor
Map size (Å)	776.88, 776.88, 776.88	wwPDB
Map dimensions	360, 360, 360	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	2.158, 2.158, 2.158	Depositor

5 Model quality [i](#)

5.1 Standard geometry [i](#)

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

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	A	0.14	0/13886	0.43	0/18750
2	B	0.11	0/2365	0.40	0/3194
2	C	0.11	0/2374	0.43	0/3206
3	H	0.13	0/2412	0.44	0/3265
4	N	0.19	0/2450	0.49	0/3285
5	O	0.12	0/2940	0.42	0/3980
5	R	0.14	0/2952	0.46	0/3997
6	P	0.18	0/1676	0.44	0/2252
6	Q	0.15	0/1650	0.41	0/2217
7	S	0.15	0/1197	0.43	0/1590
8	U	0.15	0/6745	0.44	0/9131
9	W	0.17	0/1794	0.39	0/2386
9	X	0.19	0/1947	0.44	0/2591
10	Y	0.19	0/313	0.47	0/419
11	Z	0.17	0/373	0.33	0/495
12	T	0.15	0/4362	0.44	0/5889
13	I	0.13	0/1418	0.50	0/1913
14	J	0.12	0/9494	0.43	0/12898
15	K	0.11	0/7367	0.42	0/10000
16	L	0.15	0/3166	0.38	0/4258
17	M	0.15	0/2813	0.42	0/3810
18	E	0.12	0/2608	0.35	0/3524
19	F	0.12	0/3704	0.38	0/5022
20	V	0.13	0/735	0.42	0/997
21	a	0.11	0/1103	0.37	0/1488
22	b	0.15	0/431	0.45	0/586
23	c	0.15	0/632	0.39	0/855
24	D	0.13	0/5573	0.41	0/7525
24	G	0.12	0/5594	0.40	0/7553
All	All	0.14	0/94074	0.42	0/127076

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
1	A	0	3
2	C	0	1
3	H	0	1
4	N	0	1
5	O	0	1
6	P	0	1
6	Q	0	2
8	U	0	1
12	T	0	1
13	I	0	1
15	K	0	4
23	c	0	1
All	All	0	18

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

5 of 18 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1838	ARG	Sidechain
1	A	186	ARG	Sidechain
1	A	246	LYS	Mainchain
2	C	286	ARG	Sidechain
3	H	72	ARG	Sidechain

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	A	13592	13598	13593	169	0
2	B	2330	2348	2347	15	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	2339	2354	2353	31	0
3	H	2353	2366	2364	33	0
4	N	2424	2433	2432	55	0
5	O	2877	2847	2846	43	0
5	R	2889	2859	2858	44	0
6	P	1659	1675	1673	31	0
6	Q	1632	1646	1645	32	0
7	S	1187	1185	1184	27	0
8	U	6604	6594	6593	93	0
9	W	1780	1842	1839	18	0
9	X	1932	2005	2003	21	0
10	Y	312	317	316	4	0
11	Z	369	382	381	1	0
12	T	4271	4334	4330	52	0
13	I	1375	1288	1288	32	0
14	J	9255	9162	9160	120	0
15	K	7188	7129	7126	80	0
16	L	3107	3005	3004	31	0
17	M	2759	2741	2736	18	0
18	E	2565	2629	2629	18	0
19	F	3629	3661	3661	34	0
20	V	723	710	710	8	0
21	a	1071	1062	1060	8	0
22	b	422	415	415	5	0
23	c	613	607	607	8	0
24	D	5466	5413	5410	55	0
24	G	5487	5423	5421	52	0
25	M	2	0	0	0	0
All	All	92212	92030	91984	1059	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 1059 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)
1:A:39:LYS:NZ	1:A:150:CYS:O	2.04	0.90
5:O:374:ARG:NE	12:T:318:GLU:OE1	2.13	0.82
14:J:833:ASP:OD1	14:J:836:ARG:NH2	2.13	0.81
14:J:624:THR:HG22	14:J:625:SER:H	1.43	0.81
4:N:654:GLU:OE2	23:c:298:ARG:NH1	2.15	0.80

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	
1	A	1655/1894 (87%)	1568 (95%)	83 (5%)	4 (0%)	44	78
2	B	286/340 (84%)	235 (82%)	49 (17%)	2 (1%)	19	56
2	C	287/340 (84%)	235 (82%)	46 (16%)	6 (2%)	5	30
3	H	281/321 (88%)	253 (90%)	23 (8%)	5 (2%)	7	34
4	N	290/783 (37%)	287 (99%)	3 (1%)	0	100	100
5	O	366/377 (97%)	348 (95%)	17 (5%)	1 (0%)	37	72
5	R	368/377 (98%)	349 (95%)	16 (4%)	3 (1%)	16	54
6	P	198/258 (77%)	191 (96%)	7 (4%)	0	100	100
6	Q	194/258 (75%)	191 (98%)	3 (2%)	0	100	100
7	S	145/172 (84%)	141 (97%)	4 (3%)	0	100	100
8	U	809/4250 (19%)	771 (95%)	35 (4%)	3 (0%)	30	68
9	W	201/1249 (16%)	200 (100%)	1 (0%)	0	100	100
9	X	223/1249 (18%)	221 (99%)	2 (1%)	0	100	100
10	Y	37/1682 (2%)	37 (100%)	0	0	100	100
11	Z	42/1843 (2%)	42 (100%)	0	0	100	100
12	T	509/4144 (12%)	495 (97%)	12 (2%)	2 (0%)	30	68
13	I	163/170 (96%)	138 (85%)	24 (15%)	1 (1%)	22	60
14	J	1139/1252 (91%)	1042 (92%)	91 (8%)	6 (0%)	25	64
15	K	903/1299 (70%)	827 (92%)	73 (8%)	3 (0%)	37	72
16	L	382/471 (81%)	376 (98%)	6 (2%)	0	100	100
17	M	343/363 (94%)	330 (96%)	12 (4%)	1 (0%)	37	72
18	E	332/334 (99%)	323 (97%)	9 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
19	F	457/500 (91%)	435 (95%)	21 (5%)	1 (0%)	44	78
20	V	90/93 (97%)	84 (93%)	5 (6%)	1 (1%)	12	46
21	a	120/536 (22%)	112 (93%)	8 (7%)	0	100	100
22	b	50/401 (12%)	47 (94%)	3 (6%)	0	100	100
23	c	71/520 (14%)	71 (100%)	0	0	100	100
24	D	674/723 (93%)	642 (95%)	31 (5%)	1 (0%)	48	83
24	G	677/723 (94%)	632 (93%)	43 (6%)	2 (0%)	37	72
All	All	11292/26922 (42%)	10623 (94%)	627 (6%)	42 (0%)	32	68

5 of 42 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
19	F	81	GLY
1	A	403	ILE
1	A	917	LYS
2	C	75	ASP
3	H	154	ILE

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	1516/1726 (88%)	1465 (97%)	51 (3%)	32	53
2	B	260/310 (84%)	252 (97%)	8 (3%)	35	55
2	C	261/310 (84%)	257 (98%)	4 (2%)	60	75
3	H	262/296 (88%)	252 (96%)	10 (4%)	28	50
4	N	268/711 (38%)	260 (97%)	8 (3%)	36	56
5	O	312/320 (98%)	308 (99%)	4 (1%)	65	77
5	R	313/320 (98%)	299 (96%)	14 (4%)	23	46
6	P	184/236 (78%)	179 (97%)	5 (3%)	40	60
6	Q	182/236 (77%)	178 (98%)	4 (2%)	47	66

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
7	S	131/153 (86%)	126 (96%)	5 (4%)	28	50
8	U	753/3820 (20%)	723 (96%)	30 (4%)	27	48
9	W	196/1148 (17%)	193 (98%)	3 (2%)	60	75
9	X	213/1148 (19%)	211 (99%)	2 (1%)	75	83
10	Y	36/1536 (2%)	35 (97%)	1 (3%)	38	59
11	Z	42/1659 (2%)	42 (100%)	0	100	100
12	T	480/3730 (13%)	474 (99%)	6 (1%)	65	77
13	I	144/149 (97%)	137 (95%)	7 (5%)	21	43
14	J	1037/1137 (91%)	997 (96%)	40 (4%)	27	49
15	K	803/1161 (69%)	784 (98%)	19 (2%)	44	63
16	L	322/401 (80%)	318 (99%)	4 (1%)	67	79
17	M	299/315 (95%)	296 (99%)	3 (1%)	73	82
18	E	282/282 (100%)	282 (100%)	0	100	100
19	F	401/440 (91%)	397 (99%)	4 (1%)	73	82
20	V	77/78 (99%)	74 (96%)	3 (4%)	27	49
21	a	116/460 (25%)	112 (97%)	4 (3%)	32	53
22	b	47/356 (13%)	46 (98%)	1 (2%)	48	67
23	c	65/467 (14%)	63 (97%)	2 (3%)	35	55
24	D	596/634 (94%)	590 (99%)	6 (1%)	73	82
24	G	598/634 (94%)	587 (98%)	11 (2%)	54	71
All	All	10196/24173 (42%)	9937 (98%)	259 (2%)	43	62

5 of 259 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
19	F	349	PHE
21	a	525	HIS
5	R	67	LEU
5	R	19	CYS
24	D	178	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 95 such sidechains are listed below:

Mol	Chain	Res	Type
14	J	227	HIS
15	K	678	HIS
14	J	513	ASN
14	J	1079	ASN
15	K	931	HIS

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 oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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.

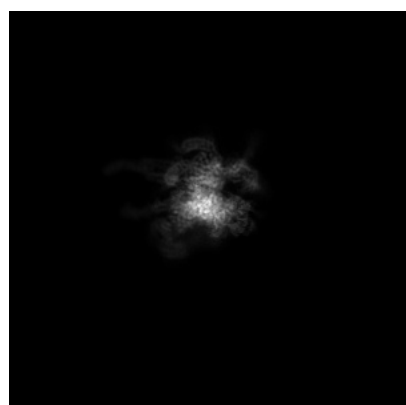
6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-46494. These allow visual inspection of the internal detail of the map and identification of artifacts.

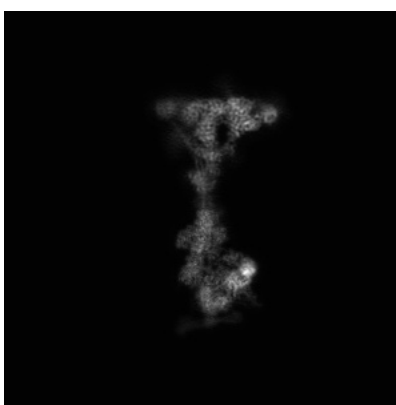
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

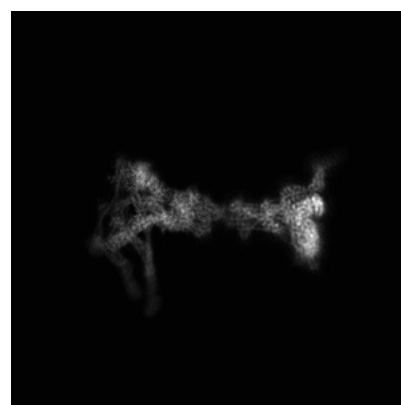
6.1.1 Primary map



X



Y

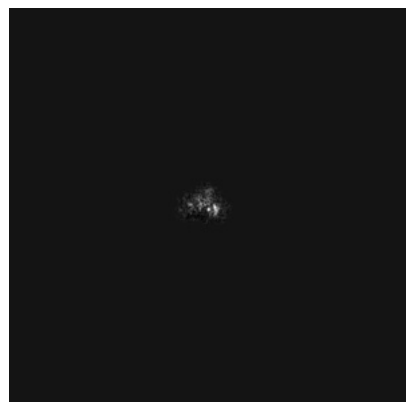


Z

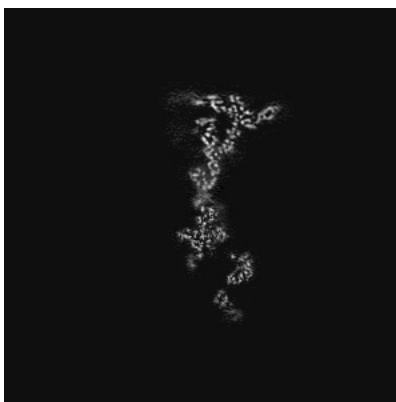
The images above show the map projected in three orthogonal directions.

6.2 Central slices [i](#)

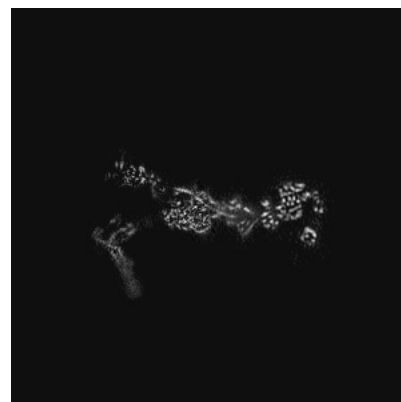
6.2.1 Primary map



X Index: 180



Y Index: 180

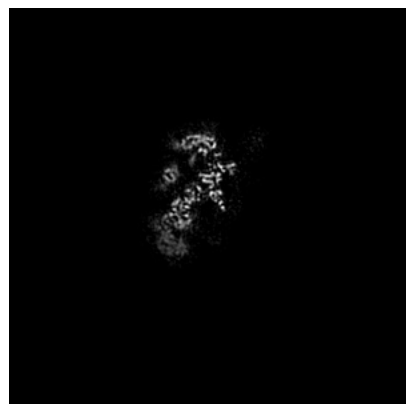


Z Index: 180

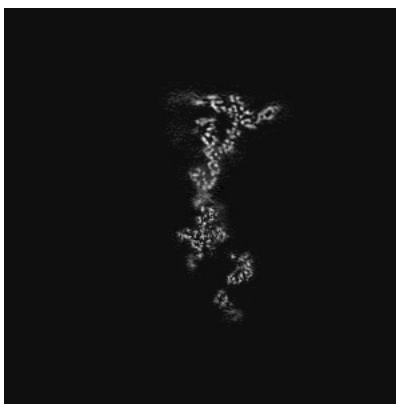
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices [i](#)

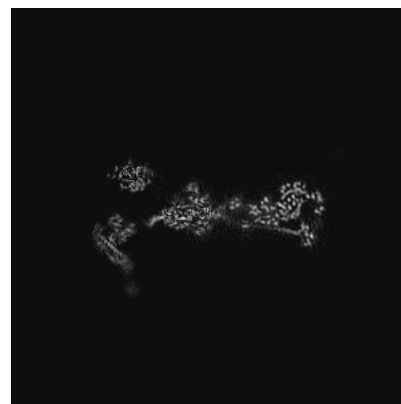
6.3.1 Primary map



X Index: 267



Y Index: 180

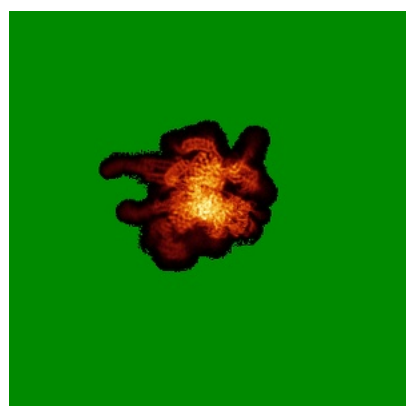


Z Index: 184

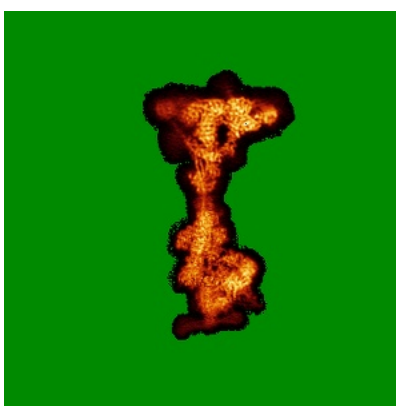
The images above show the largest variance slices of the map in three orthogonal directions.

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

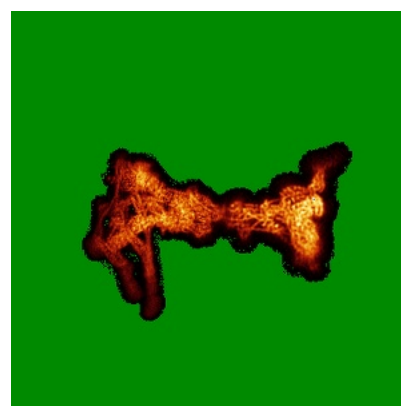
6.4.1 Primary map



X



Y

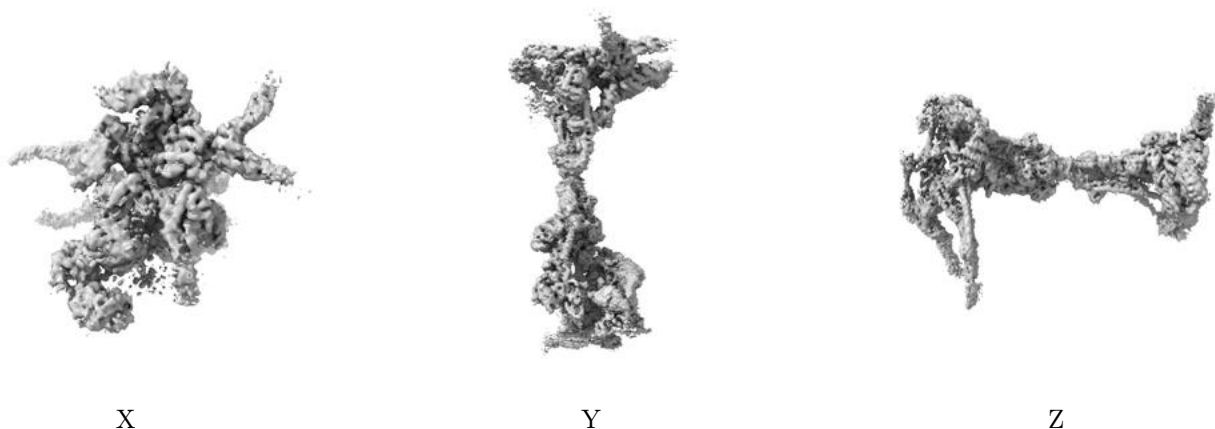


Z

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 0.0037. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

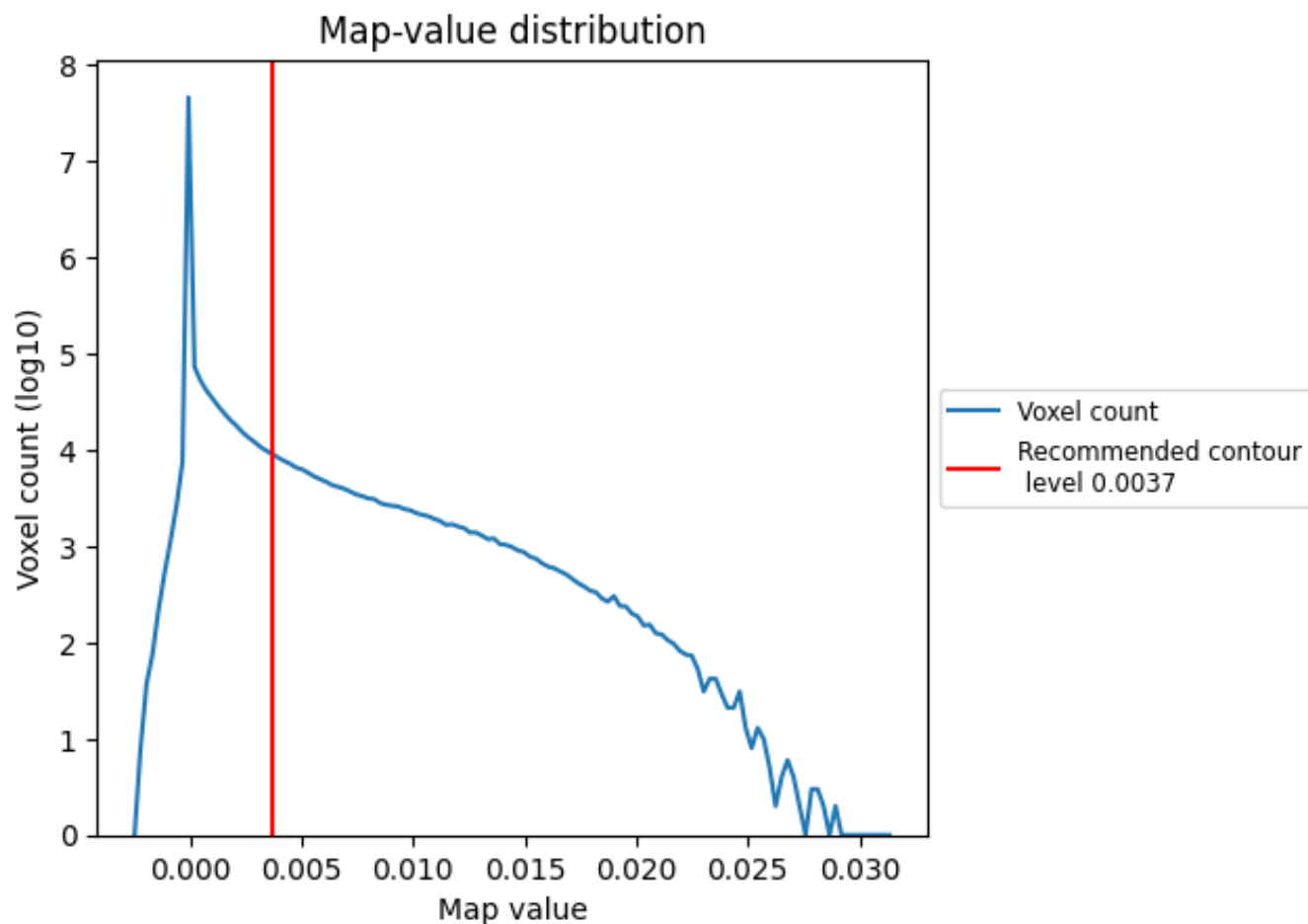
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

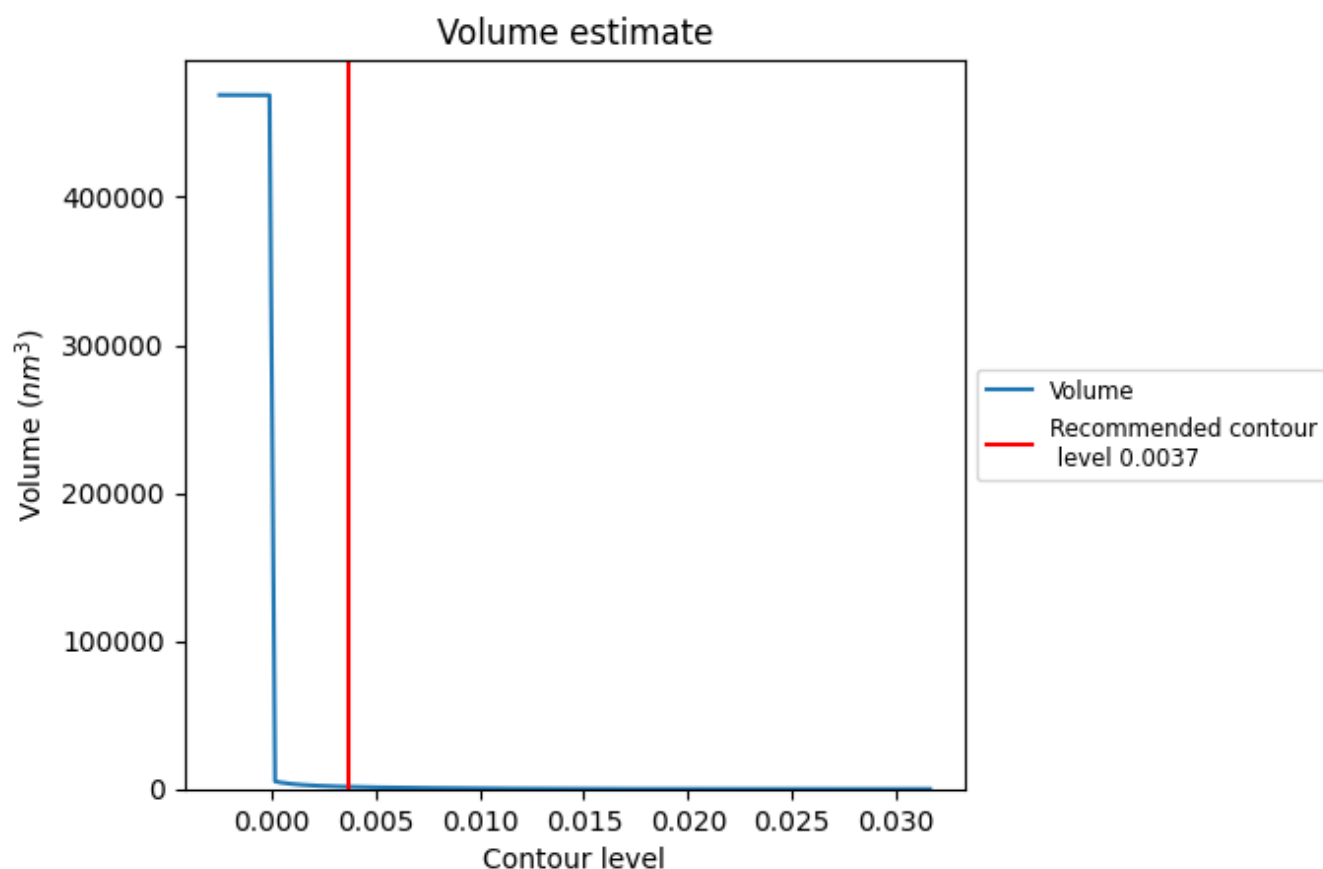
This section contains the results of statistical analysis of the map.

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.

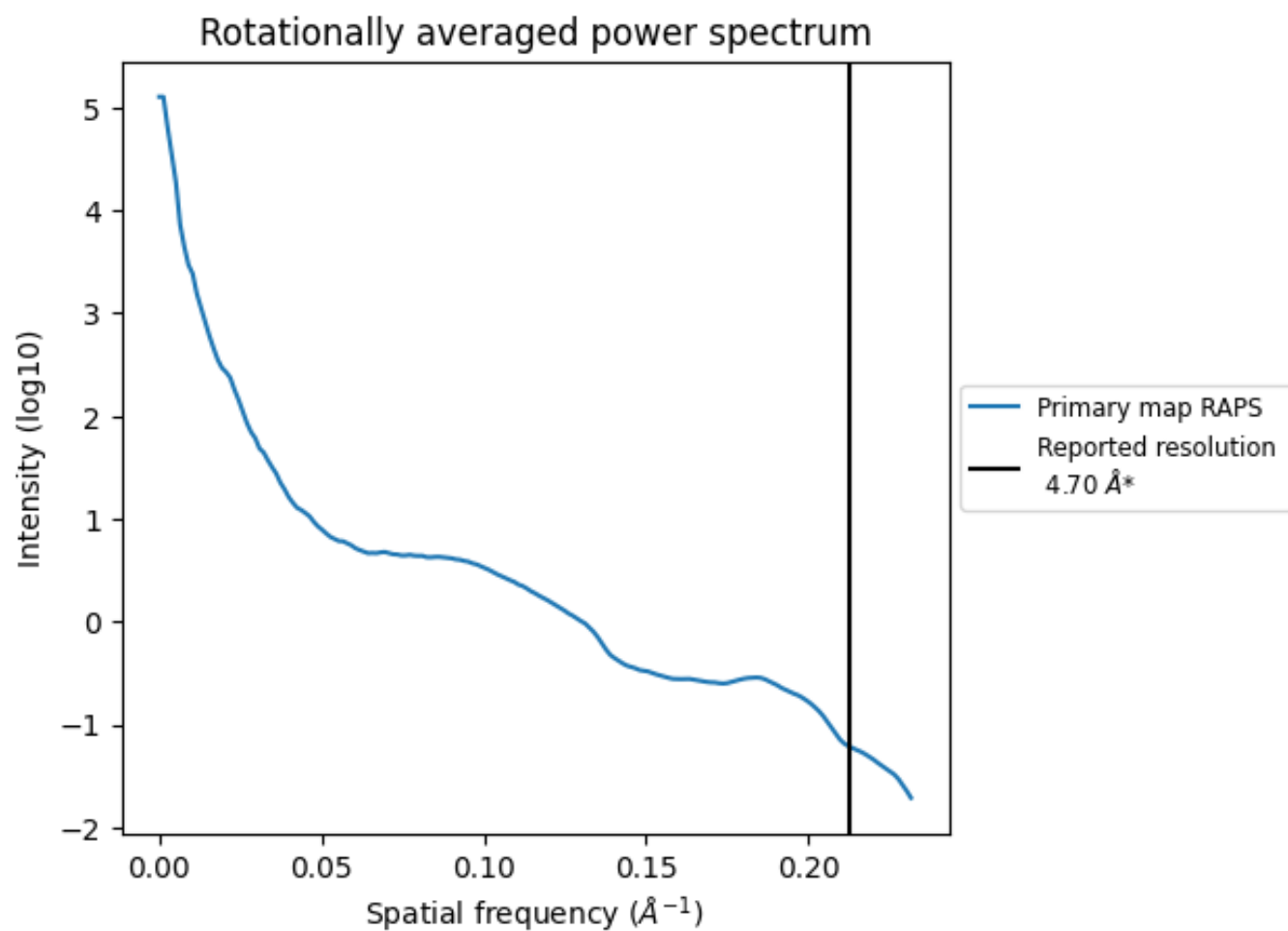
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 1486 nm^3 ; this corresponds to an approximate mass of 1342 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 ⓘ



*Reported resolution corresponds to spatial frequency of 0.213 Å⁻¹

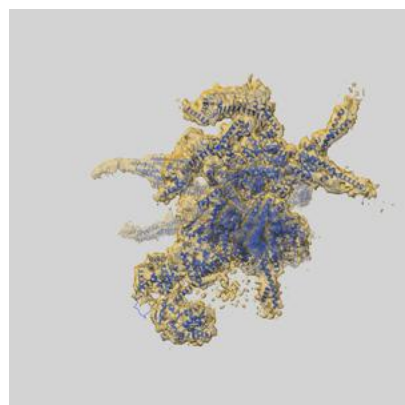
8 Fourier-Shell correlation

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

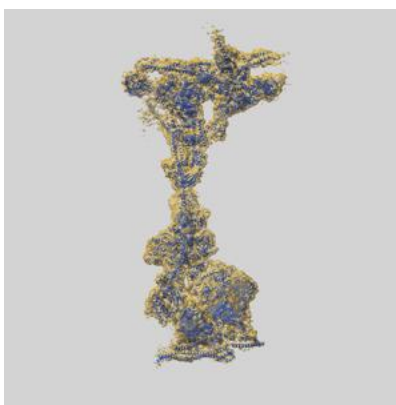
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-46494 and PDB model 9D2F. Per-residue inclusion information can be found in section [3](#) on page [8](#).

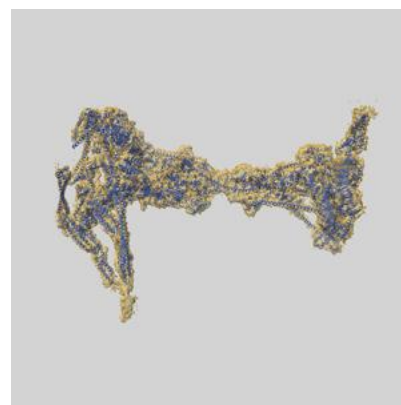
9.1 Map-model overlay [i](#)



X



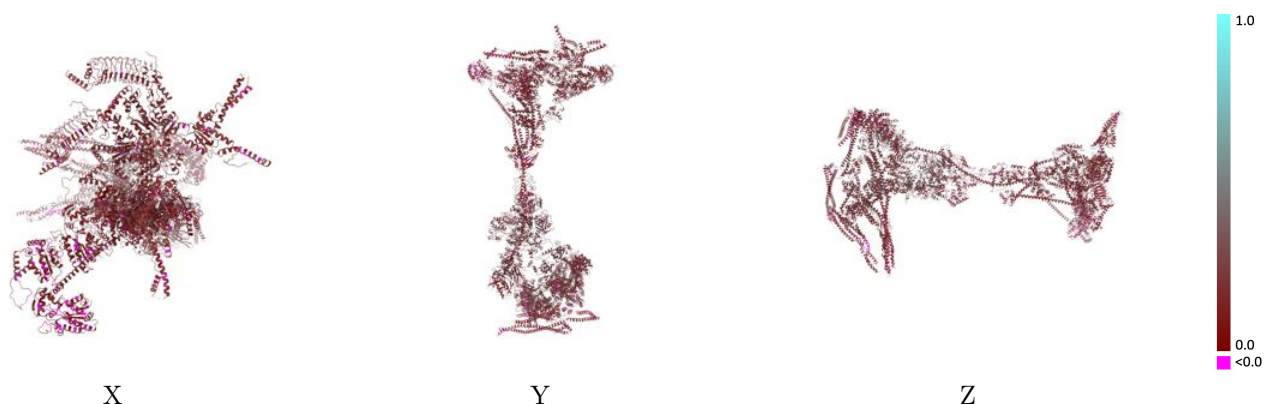
Y



Z

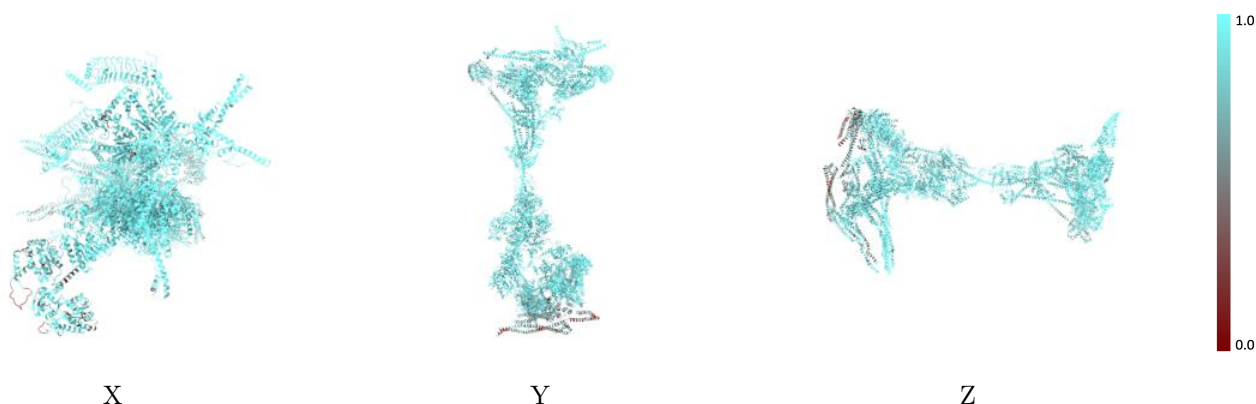
The images above show the 3D surface view of the map at the recommended contour level 0.0037 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

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



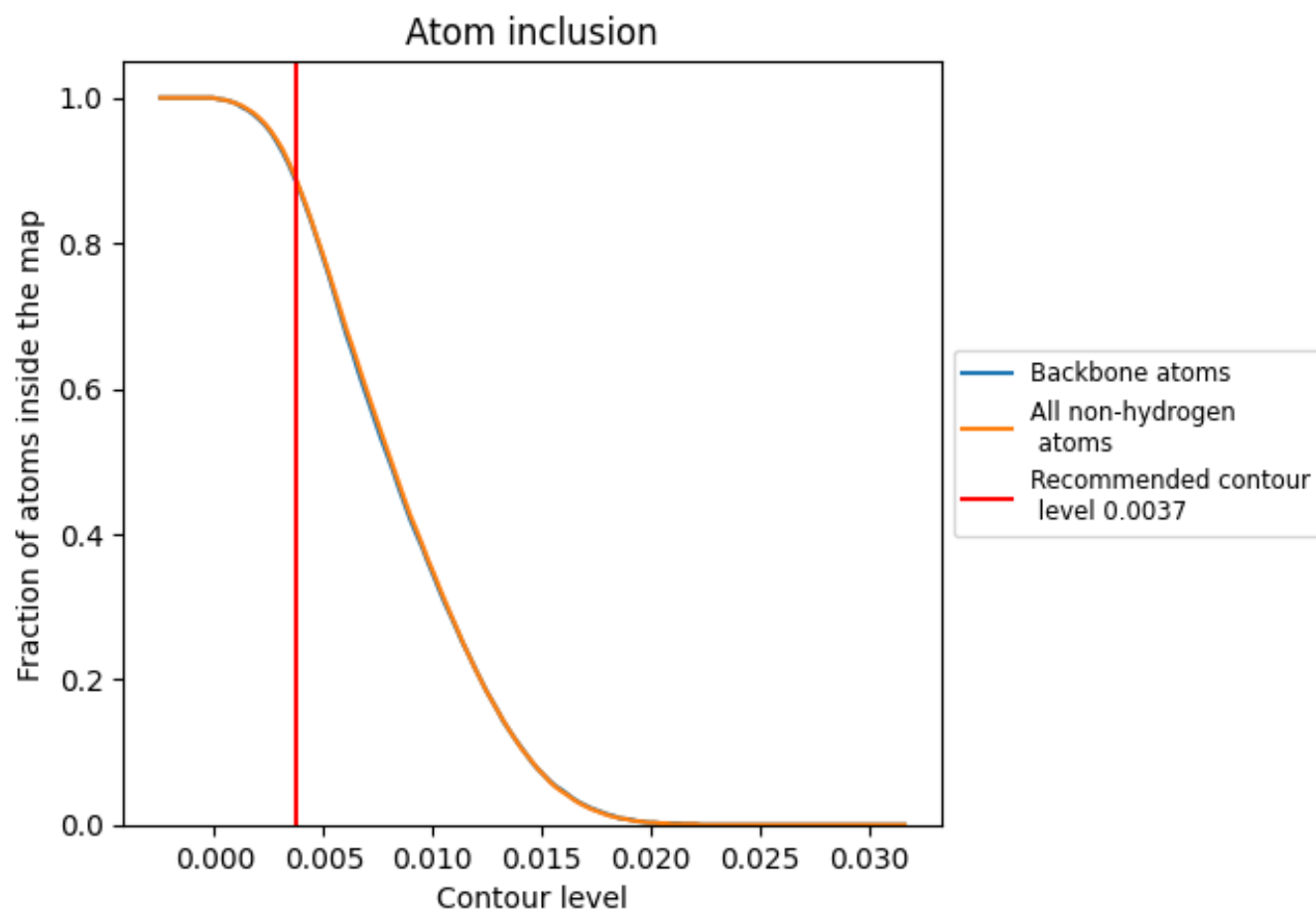
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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 (0.0037).

9.4 Atom inclusion [i](#)



At the recommended contour level, 89% of all backbone atoms, 89% 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 (0.0037) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.8910	 0.2300
A	 0.9380	 0.2190
B	 0.9650	 0.1980
C	 0.9610	 0.1950
D	 0.7990	 0.1570
E	 0.9160	 0.2020
F	 0.9340	 0.2000
G	 0.9210	 0.2100
H	 0.9140	 0.2490
I	 0.9660	 0.2080
J	 0.9510	 0.2870
K	 0.9070	 0.3080
L	 0.9310	 0.2280
M	 0.7470	 0.2070
N	 0.9240	 0.1950
O	 0.9150	 0.2280
P	 0.8950	 0.2350
Q	 0.9020	 0.2380
R	 0.9400	 0.2980
S	 0.7830	 0.2250
T	 0.8270	 0.2070
U	 0.9250	 0.2700
V	 0.9660	 0.2070
W	 0.5750	 0.1870
X	 0.5520	 0.1840
Y	 0.4610	 0.1890
Z	 0.3740	 0.2040
a	 0.9750	 0.1740
b	 0.9930	 0.2120
c	 0.9700	 0.1830

