wwPDB EM Validation Summary Report ⓘ

Nov 14, 2022 – 09:17 AM EST

PDB ID	:	7K58
EMDB ID	:	EMD-22677
Title	:	Structure of outer-arm dyneins bound to microtubule with microtubule binding state 1(MTBS-1)
Authors	:	Qinhui, R.; Kai, Z.
Deposited on	:	2020-09-16
Resolution	:	3.50 Å(reported)

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

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

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

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

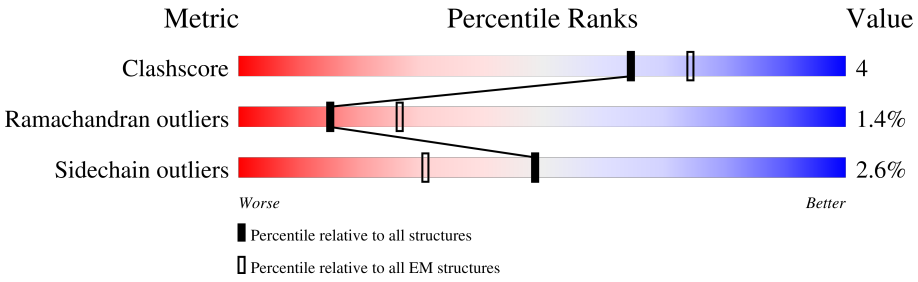
EMDB validation analysis	:	0.0.1.dev43
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.9
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.31.2

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 3.50 Å.

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



Metric	Whole archive (#Entries)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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	A	4615	19% 86% 9% ·
2	C	3943	22% 90% 10% ·
3	Q	192	12% 95% 5%
4	B	4588	17% 85% 12% · ·
5	I	106	26% 79% 18% ·
6	H	91	30% 90% 9% ·
7	G	96	31% 86% 14%
8	F	110	25% 82% 17% ·

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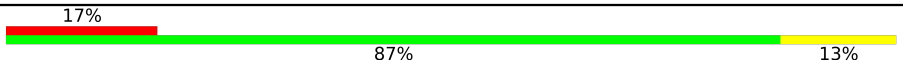
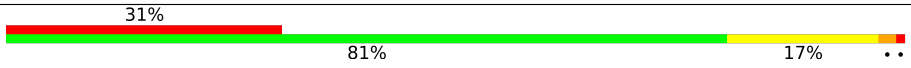
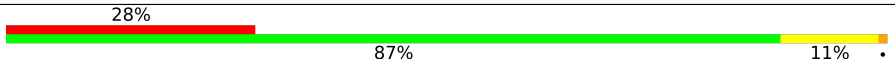
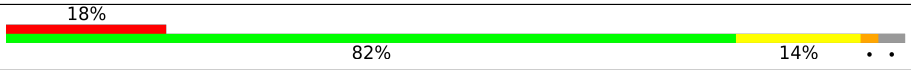
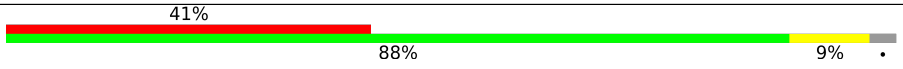
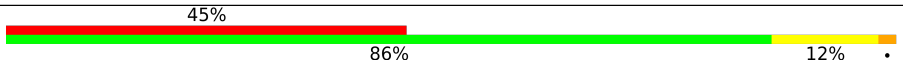
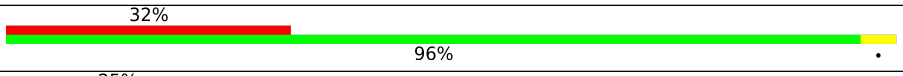
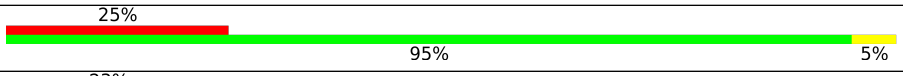
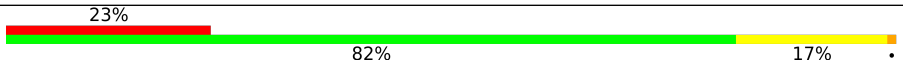
Mol	Chain	Length	Quality of chain
9	N	114	
10	O	120	
11	E	557	
12	D	595	
13	P	112	
14	L	98	
15	K	90	
16	J	95	
17	M	87	

2 Entry composition (i)

There are 20 unique types of molecules in this entry. The entry contains 117936 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 Dynein heavy chain, outer arm protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	4443	33894	21519	5788	6429	158	0	0

- Molecule 2 is a protein called gamma heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	C	3943	30436	19390	5162	5735	149	0	0

- Molecule 3 is a protein called Dynein light chain 1.

Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
3	Q	192	1002	607	202	193	2	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
Q	2	ALA	SER	conflict	UNP Q1HGH9

- Molecule 4 is a protein called Outer arm dynein beta heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	B	4516	34604	21978	5928	6547	151	0	0

- Molecule 5 is a protein called Dynein light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	I	106	827	526	134	161	6	0	0

- Molecule 6 is a protein called Dynein light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	H	91	Total	C	N	O	S	0	0
			750	483	124	139	4		

- Molecule 7 is a protein called Dynein light chain roadblock.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	G	96	Total	C	N	O	S	0	0
			749	471	129	148	1		

- Molecule 8 is a protein called Dynein light chain roadblock-type 2 protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	F	110	Total	C	N	O	S	0	0
			863	544	152	165	2		

- Molecule 9 is a protein called Dynein light chain tctex-type 1 protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	N	114	Total	C	N	O	S	0	0
			855	543	143	166	3		

- Molecule 10 is a protein called Dynein light chain 2A.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	O	120	Total	C	N	O	S	0	0
			986	634	172	177	3		

- Molecule 11 is a protein called Flagellar outer dynein arm intermediate protein, putative.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	E	555	Total	C	N	O	S	0	0
			4423	2786	759	856	22		

- Molecule 12 is a protein called Dynein intermediate chain 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	D	579	Total	C	N	O	S	0	0
			4664	2964	787	883	30		

- Molecule 13 is a protein called Thioredoxin.

Mol	Chain	Residues	Atoms				AltConf	Trace
13	P	109	Total	C	N	O	0	0
			541	323	109	109		

- Molecule 14 is a protein called Dynein light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	L	98	Total	C	N	O	S	0	0
			783	511	132	137	3		

- Molecule 15 is a protein called Dynein light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	K	90	Total	C	N	O	S	0	0
			754	489	124	137	4		

- Molecule 16 is a protein called Dynein light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	J	95	Total	C	N	O	S	0	0
			806	527	135	140	4		

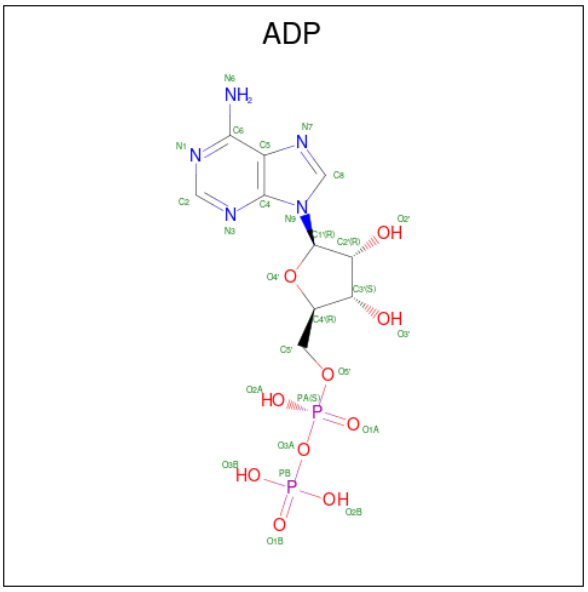
There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
J	32	ALA	CYS	conflict	UNP Q22R86

- Molecule 17 is a protein called Dynein light chain.

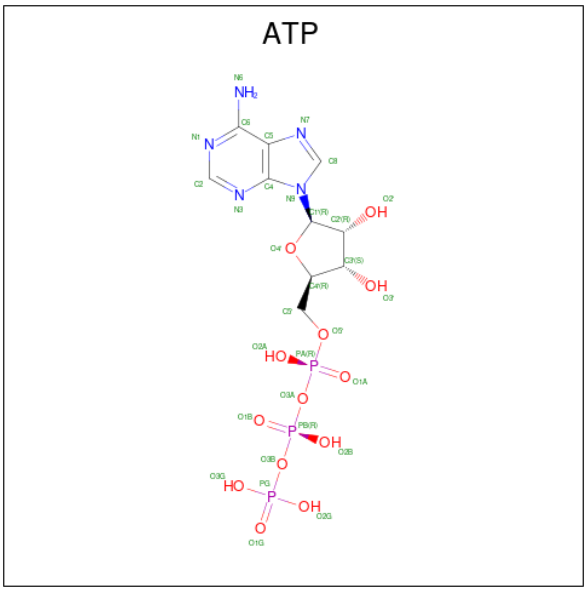
Mol	Chain	Residues	Atoms					AltConf	Trace
17	M	87	Total	C	N	O	S	0	0
			735	477	123	130	5		

- Molecule 18 is ADENOSINE-5'-DIPHOSPHATE (three-letter code: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$).



Mol	Chain	Residues	Atoms					AltConf
18	A	1	Total	C	N	O	P	0
			54	20	10	20	4	
18	A	1	Total	C	N	O	P	0
			54	20	10	20	4	
18	C	1	Total	C	N	O	P	0
			54	20	10	20	4	
18	C	1	Total	C	N	O	P	0
			54	20	10	20	4	
18	B	1	Total	C	N	O	P	0
			54	20	10	20	4	
18	B	1	Total	C	N	O	P	0
			54	20	10	20	4	

- Molecule 19 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).



Mol	Chain	Residues	Atoms					AltConf
19	A	1	Total	C	N	O	P	0
			31	10	5	13	3	
19	C	1	Total	C	N	O	P	0
			31	10	5	13	3	
19	B	1	Total	C	N	O	P	0
			31	10	5	13	3	

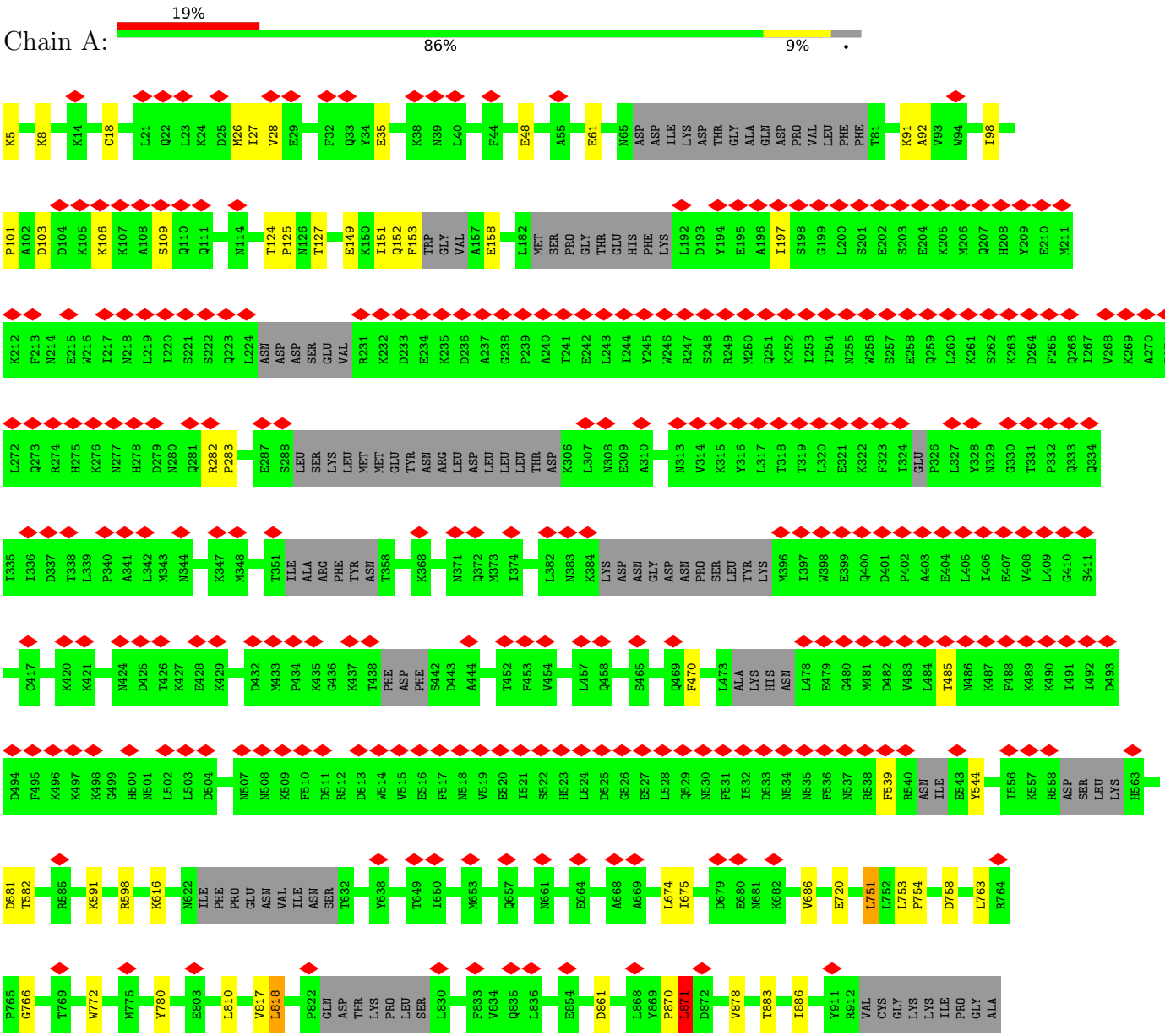
- Molecule 20 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

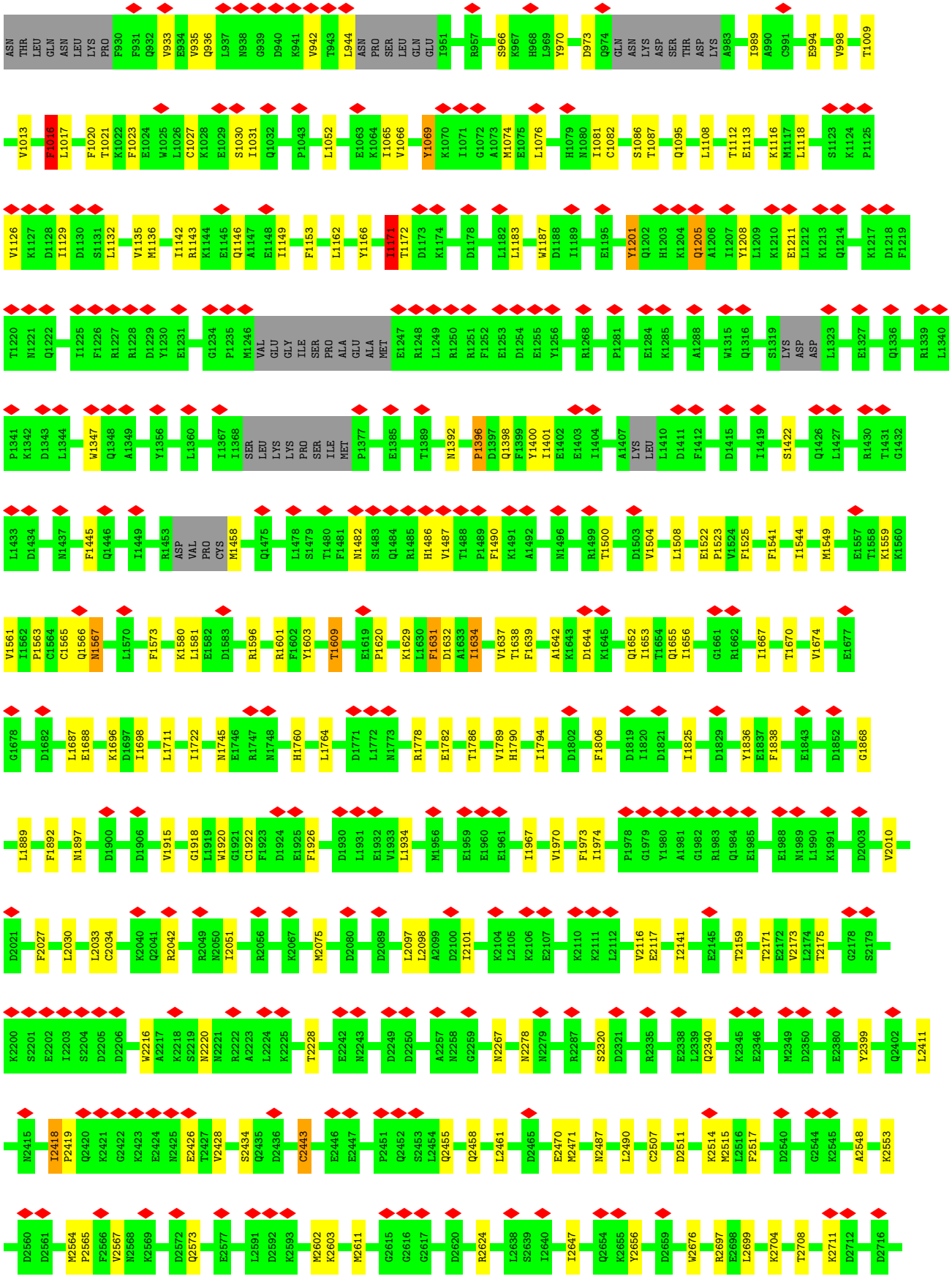
Mol	Chain	Residues	Atoms		AltConf
20	A	3	Total	Mg	0
			3	3	
20	C	3	Total	Mg	0
			3	3	
20	B	3	Total	Mg	0
			3	3	

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: Dynein heavy chain, outer arm protein

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V1013 P1016 L1017 F1020 T1021 K1022 F1023 E1024 V1025 L1026 C1027 K1028 E1029 S1030 I1031 Q1032 P1043 L1052 E1063 K1064 I1065 V1066 Y1069 K1070 I1071 G1072 A1073 M1074 E1075 L1076 H1079 N1080 I1081 C1082 S1086 T1087 Q1095 L1108 T1112 E1113 K1116 M1117 L1118 S1123 K1124 P1125
V1126 K1127 D1128 I1129 D1130 S1131 L1132 V1135 M1136 I1142 R1143 K1144 E1145 Q1146 A1147 E1148 I1149 F1153 L1162 Y1166 I1171 T1172 D1173 K1174 D1178 L1182 L1183 W1187 D1188 I1189 E1195 Y1201 Q1202 H1203 K1204 Q1205 A1206 I1207 Y1208 L1209 K1210 E1211 L1212 K1213 Q1214 K1217 D1218 F1219
T1220 N1221 Q1222 I1225 F1226 R1227 R1228 D1229 Y1230 E1231 G1234 P1235 M1246 VAL GLU GLY ILE SER PRO ALA GLU ALA MET E1247 R1248 L1249 R1250 R1251 F1252 E1253 D1254 E1255 Y1256 R1268 P1281 E1284 K1285 A1288 W1315 Q1316 S1319 LYS ASP ASP L1323 E1327 Q1336 R1339 L1340
P1341 K1342 D1343 L1344 W1347 Q1348 A1349 Y1356 L1360 I1367 I1368 SER LEU LYS LYS PRO SER ILE MET P1377 E1385 T1389 N1392 P1396 D1397 Q1398 F1399 Y1400 I1401 E1402 E1403 I1404 A1407 LYS LEU L1410 D1411 F1412 D1415 I1419 S1422 Q1426 L1427 R1430 T1431 G1432
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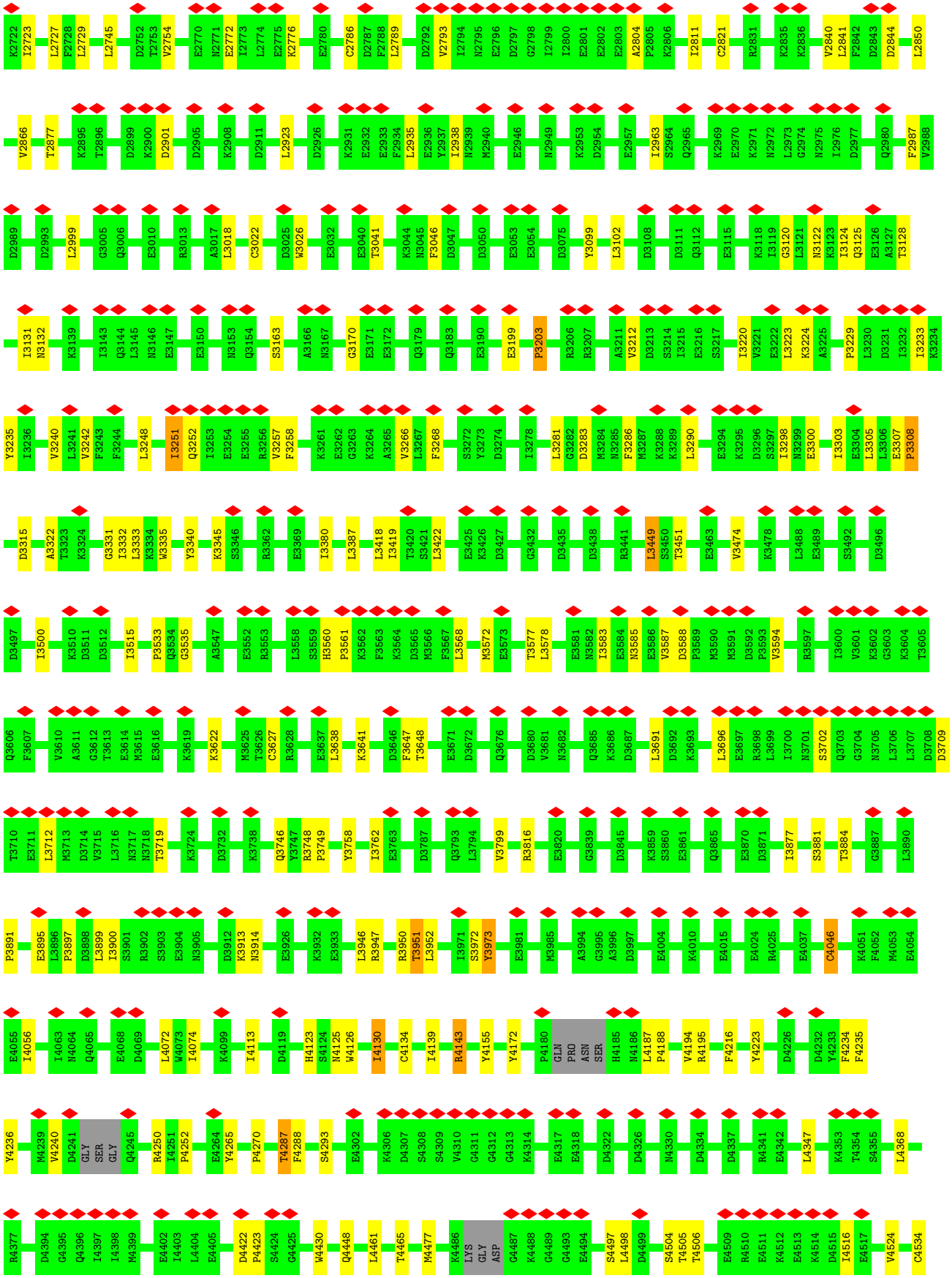
D2560 D2561 M2564 P2565 F2566 Y2567 N2568 K2569 D2572 Q2573 E2577 L2591 D2592 K2593 M2602 K2603 M2611 G2615 G2616 G2617 D2620 R2624 L2638 S2639 I2640 I2647 Q2654 K2655 Y2656 D2659 W2676 R2697 E2698 L2699 K2704 T2708 K2711 D2712 D2716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I3131 N3132 K3139 I3143 Q3144 L3145 N3146 E3147 E3150 N3153 Q3154 S3163 A3166 N3167 G3170 E3171 E3172 Q3179 Q3183 E3190 E3199 P3203 R3206 R3207 A3211 V3212 D3213 S3214 I3215 E3216 S3217 I3220 V3221 E3222 L3223 K3224 A3225 P3229 L3230 D3231 I3232 I3233 K3234
Y3235 I3236 V3240 L3241 V3242 F3243 F3244 L3248 I3251 Q3252 I3253 E3254 E3255 R3256 V3257 F3258 K3261 E3262 G3263 K3264 A3265 V3266 L3267 F3268 S3272 Y3273 D3274 I3278 L3281 G3282 D3283 M3284 N3285 F3286 M3287 K3288 K3289 L3290 E3294 K3295 D3296 S3297 I3298 N3299 E3300 I3303 E3304 L3305 L3306 E3307 P3308
D3315 A3322 T3323 K3324 G3331 I3332 L3333 K3334 W3335 Y3340 K3345 S3346 R3362 E3369 I3380 L3387 L3418 I3419 T3420 S3421 L3422 E3425 K3426 D3427 G3432 D3435 D3438 R3441 L3449 S3450 T3451 E3463 V3474 K3478 L3488 E3489 S3492 D3496
D3497 I3500 K3510 D3511 D3512 I3515 P3533 Q3534 G3535 A3547 E3552 R3553 L3558 S3559 H3560 P3561 K3562 F3563 K3564 D3565 M3566 F3567 L3568 M3572 E3573 T3577 L3578 E3581 N3582 I3583 E3584 N3585 E3586 V3587 D3588 P3589 M3590 M3591 D3592 P3593 V3594 R3597 I3600 V3601 K3602 G3603 K3604 T3605
Q3606 F3607 V3610 A3611 G3612 T3613 E3614 M3615 E3616 K3619 K3622 M3625 T3626 C3627 R3628 E3637 L3638 K3641 D3646 F3647 T3648 E3671 D3672 Q3676 D3680 V3681 N3682 Q3685 K3686 D3687 L3691 D3692 K3693 I3696 E3697 R3698 L3699 I3700 N3701 S3702 Q3703 G3704 N3705 L3706 L3707 D3708 D3709
T3710 E3711 L3712 M3713 D3714 V3715 L3716 N3717 N3718 T3719 K3724 D3732 K3738 Q3746 Y3747 R3748 P3749 Y3758 I3762 E3763 D3787 Q3793 L3794 V3799 R3816 E3820 G3839 D3845 K3859 S3860 E3861 Q3865 E3870 D3871 I3877 S3881 T3884 G3887 L3890
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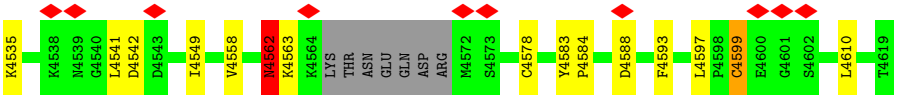
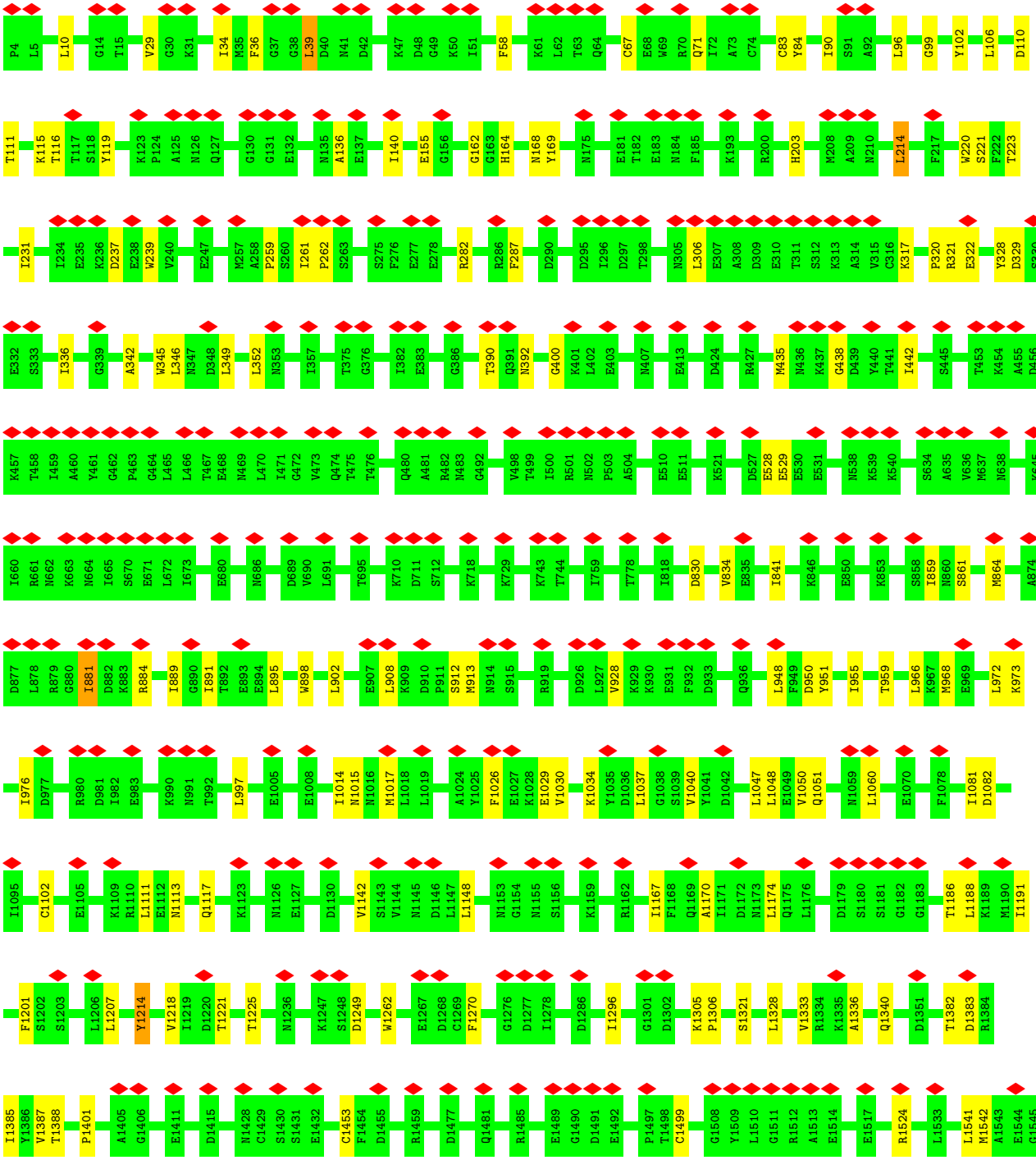
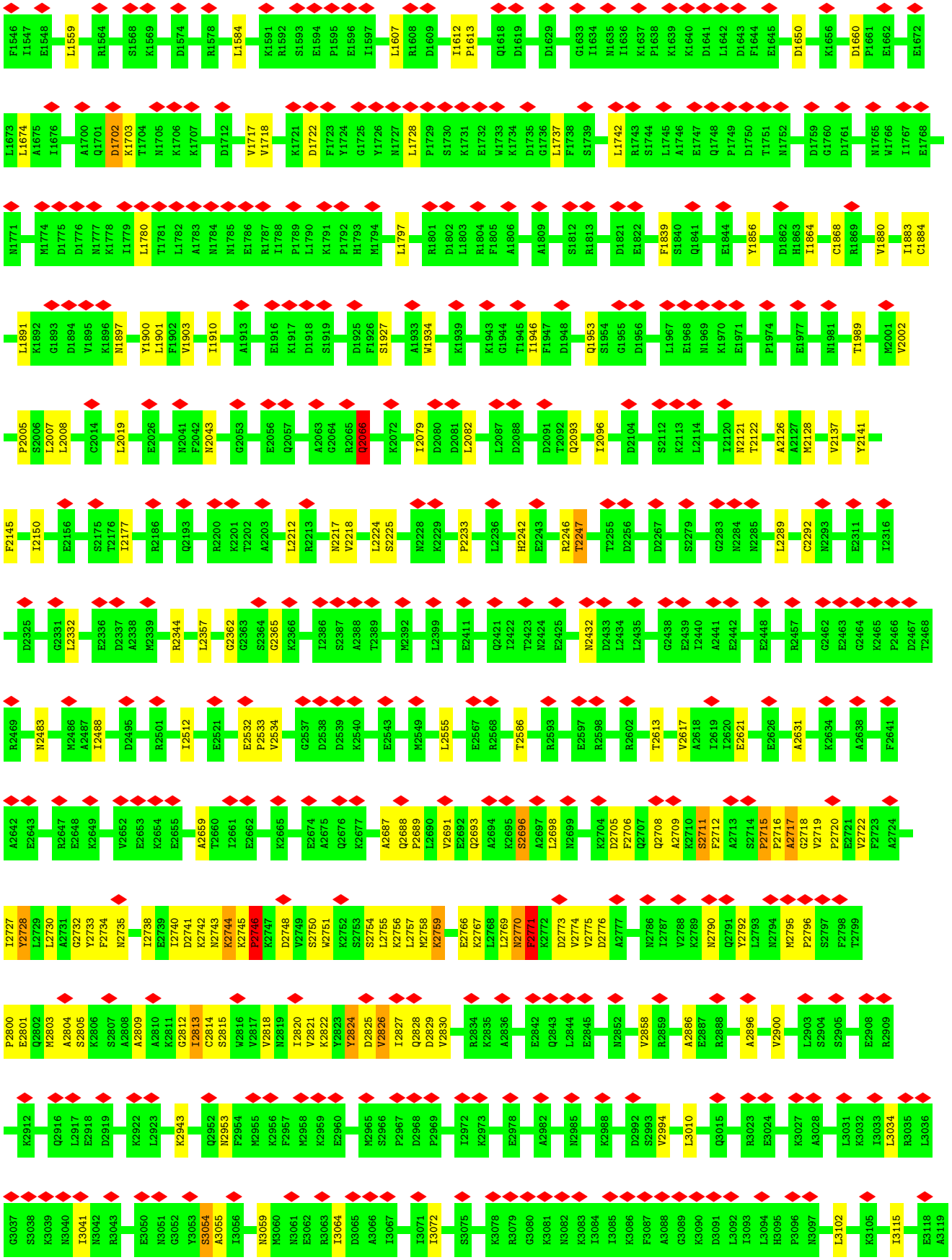


• Molecule 2: gamma heavy chain

Chain C:

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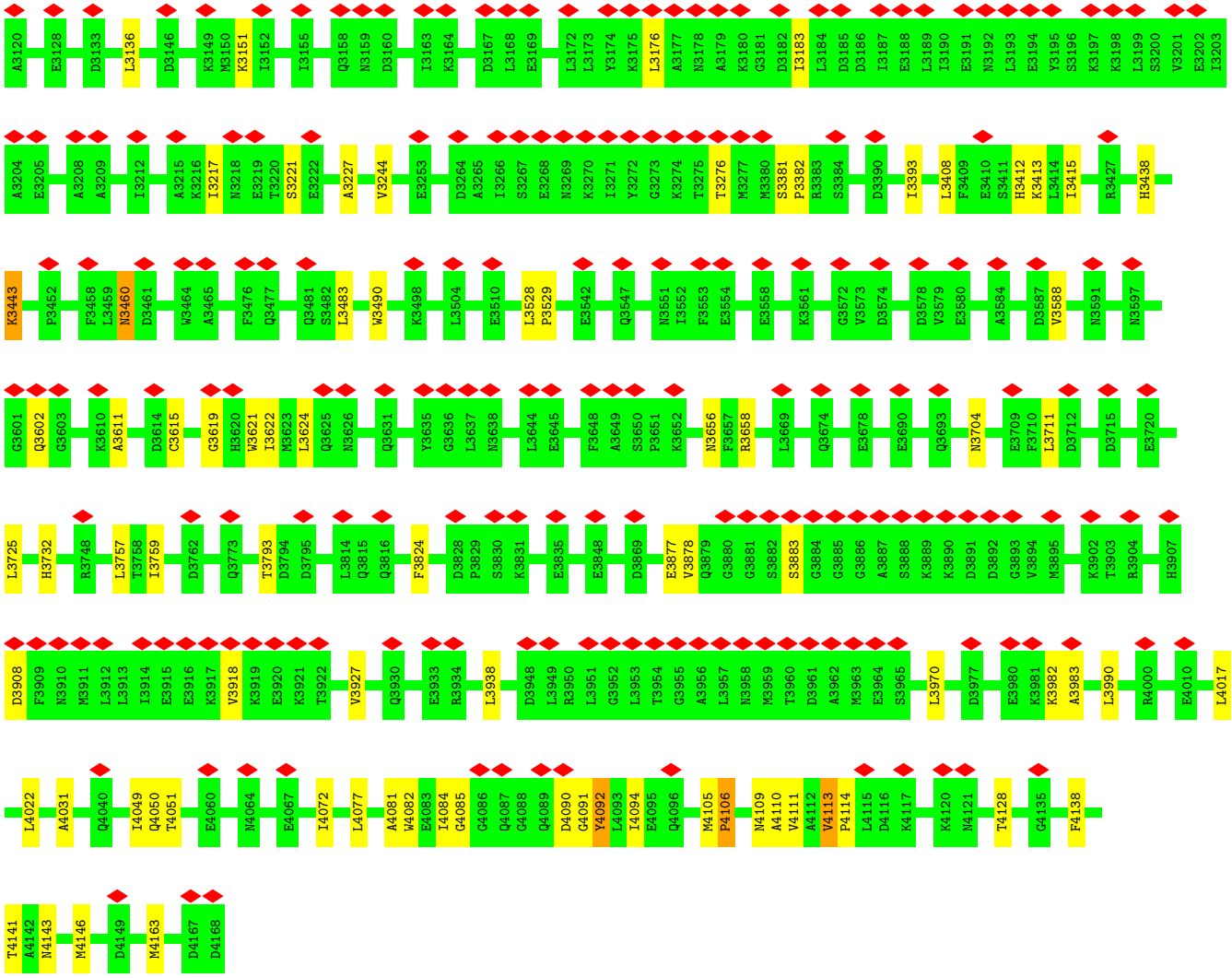
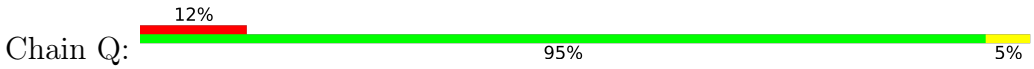
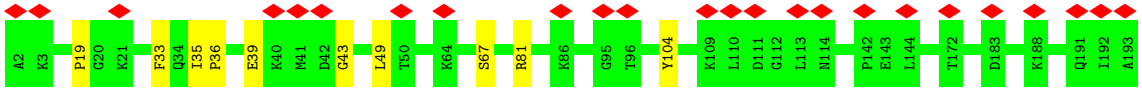
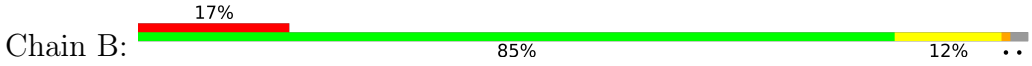


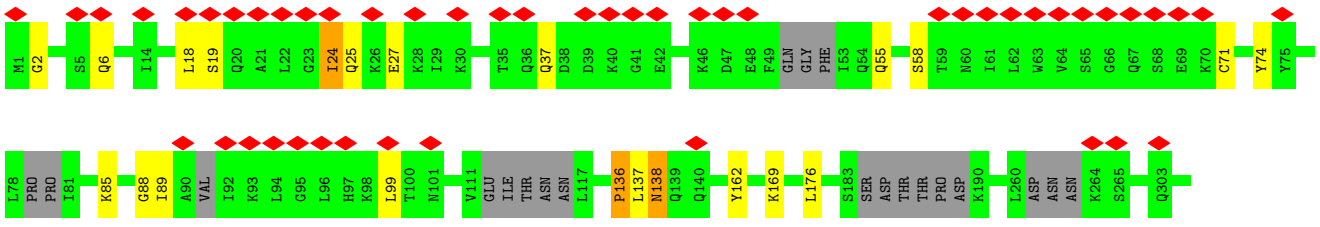
• Molecule 3: Dynein light chain 1

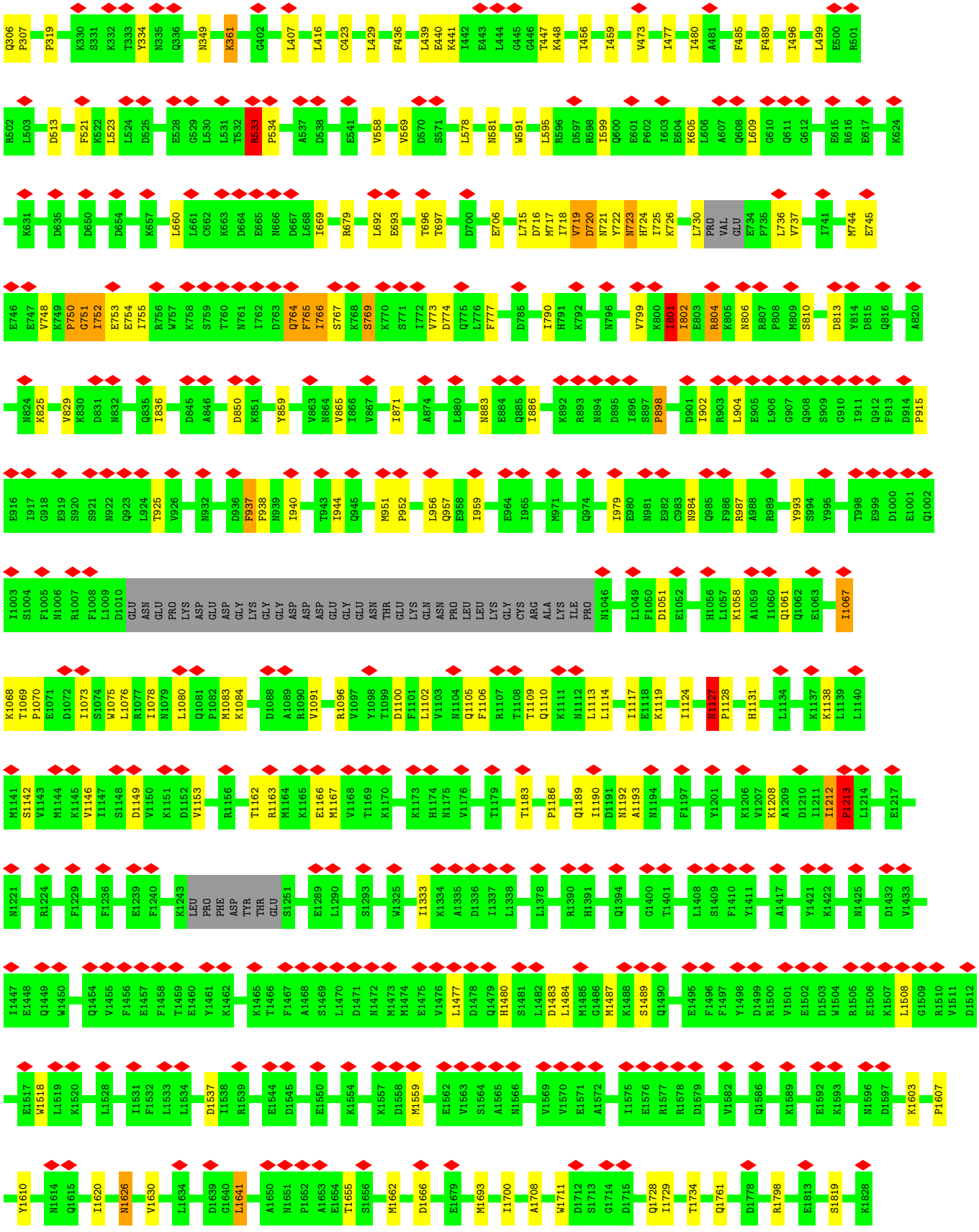




• Molecule 4: Outer arm dynein beta heavy chain



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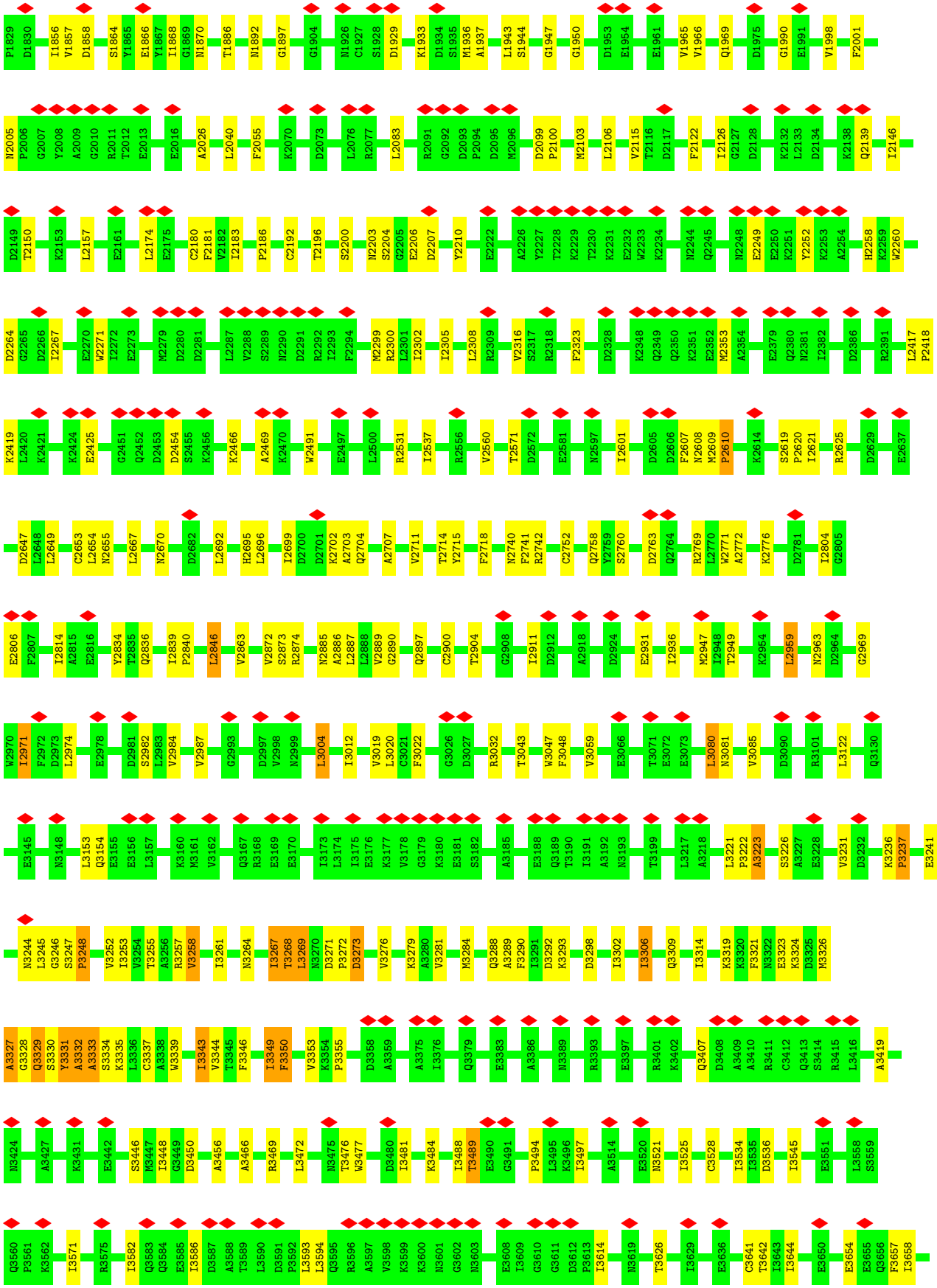
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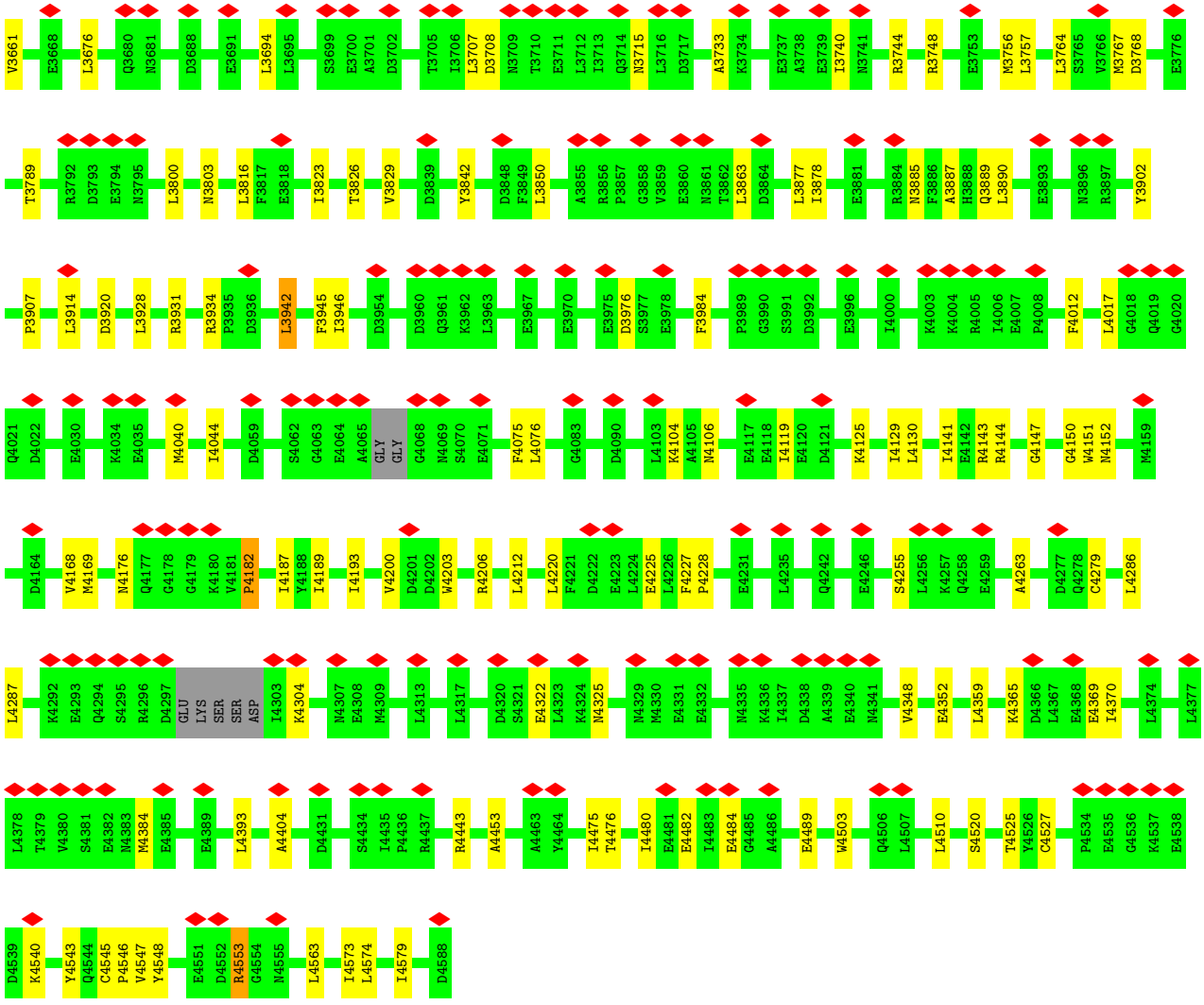

- Molecule 5: Dynein light chain

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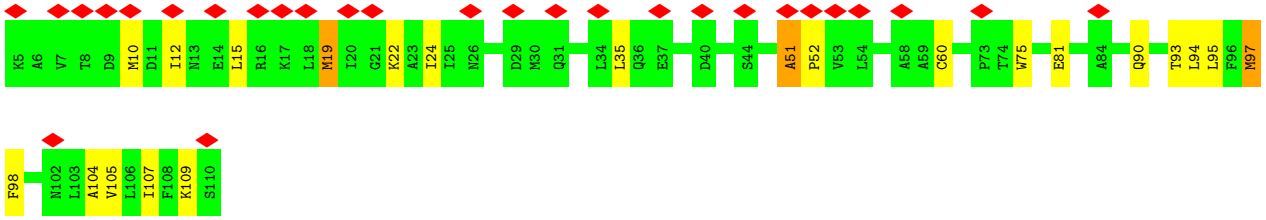

- Molecule 6: Dynein light chain

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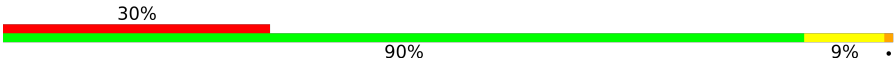
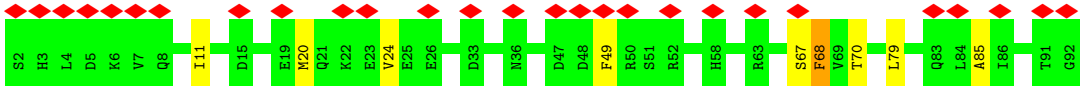
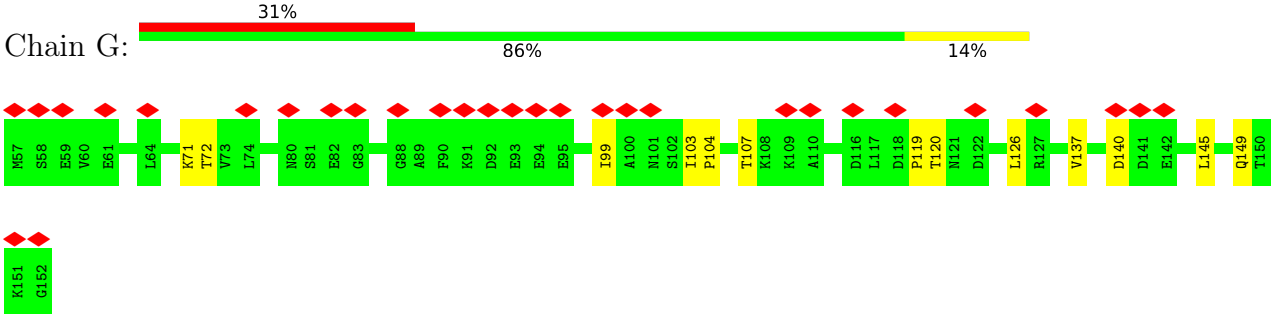




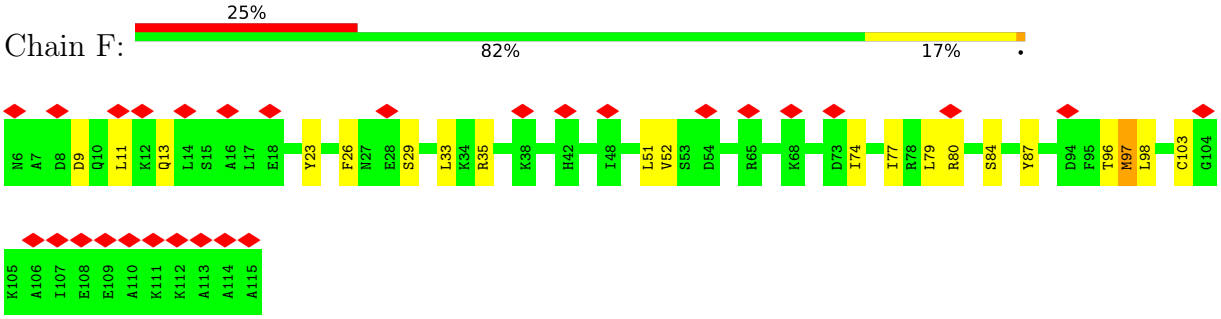
• Molecule 7: Dynein light chain roadblock

Chain G:



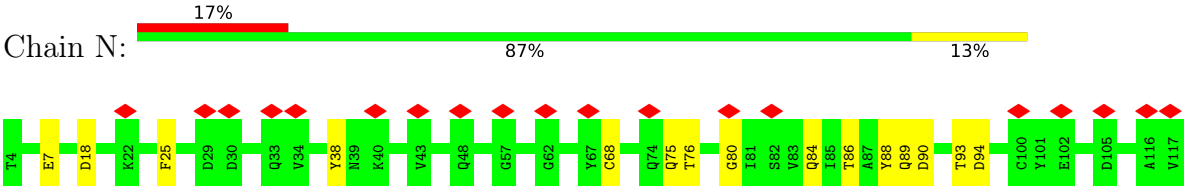
• Molecule 8: Dynein light chain roadblock-type 2 protein

Chain F:



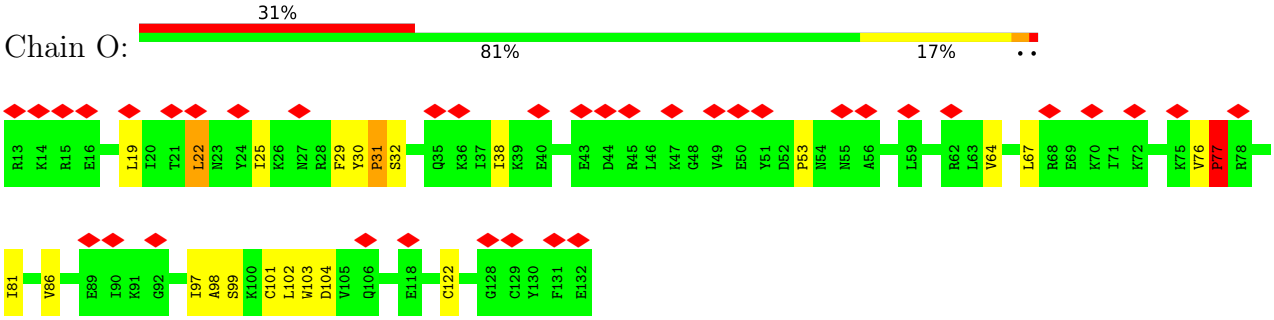
• Molecule 9: Dynein light chain tctex-type 1 protein

Chain N:



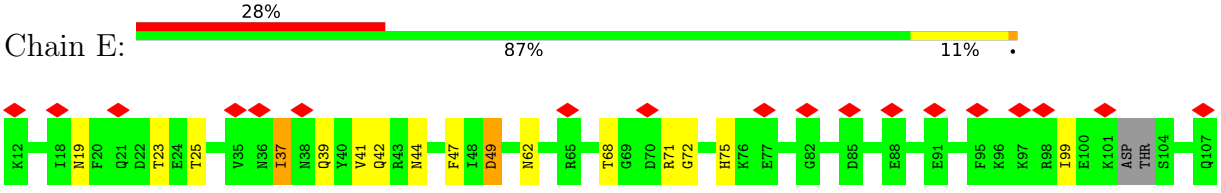
• Molecule 10: Dynein light chain 2A

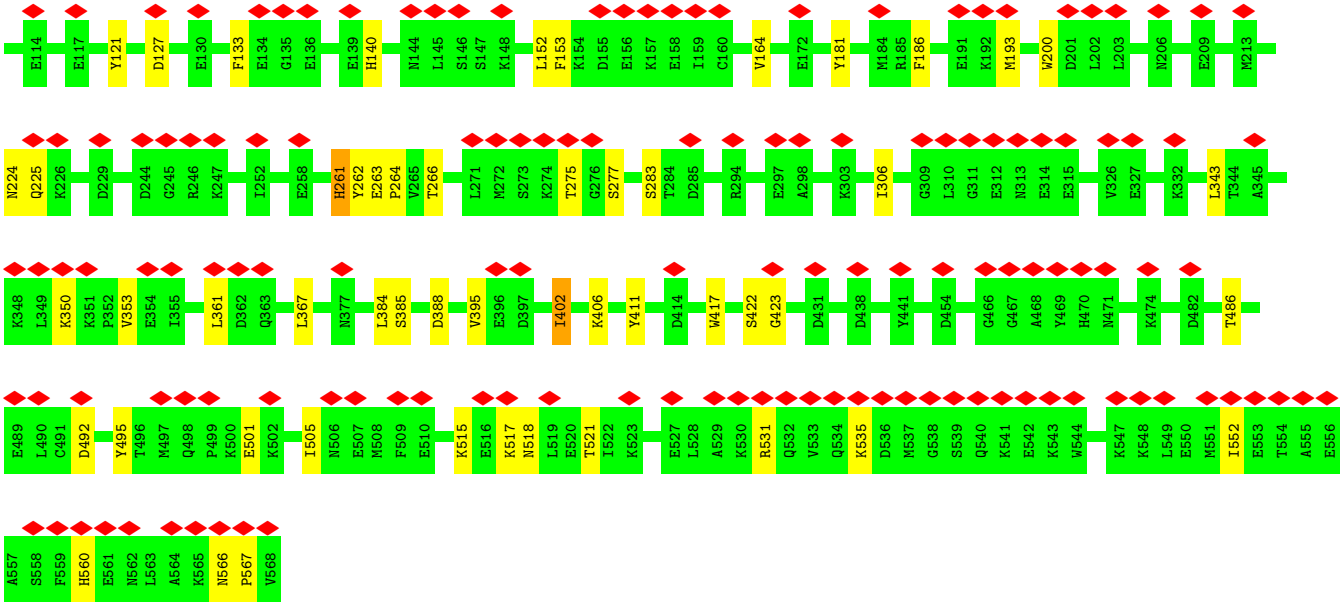
Chain O:



• Molecule 11: Flagellar outer dynein arm intermediate protein, putative

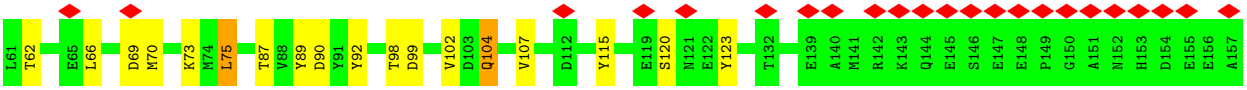
Chain E:

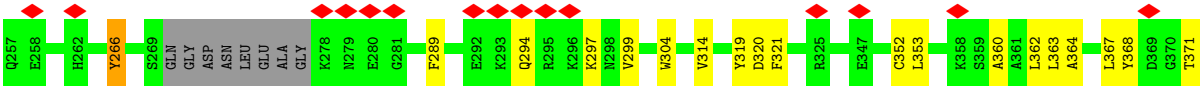


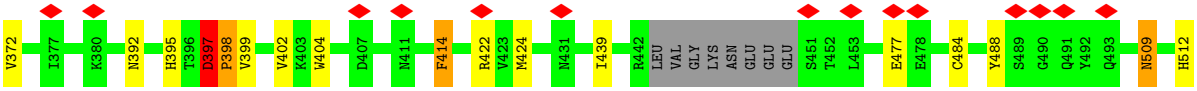


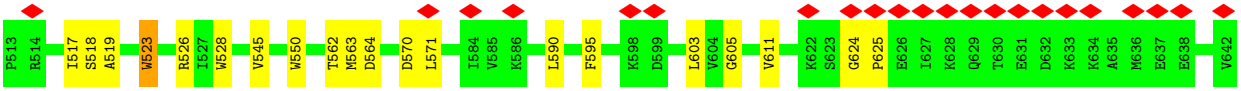
• Molecule 12: Dynein intermediate chain 2

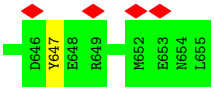
Chain D:





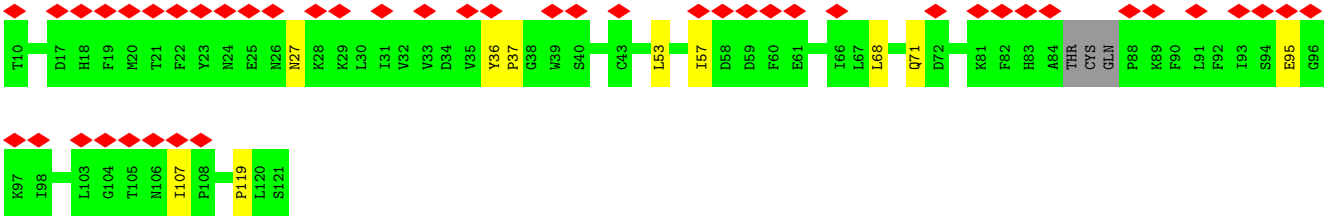




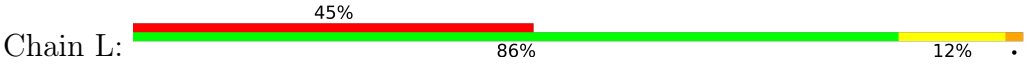


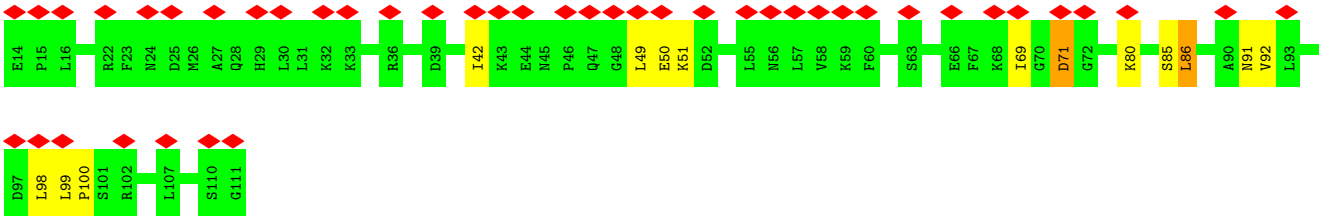
• Molecule 13: Thioredoxin

Chain P:

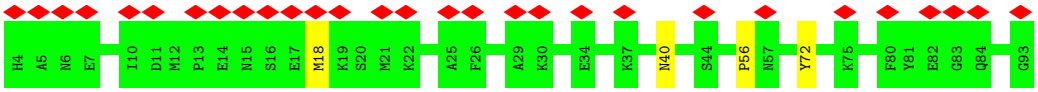


• Molecule 14: Dynein light chain

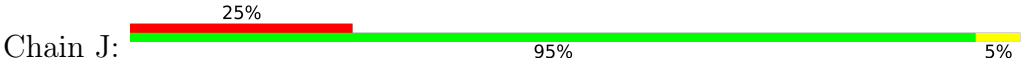


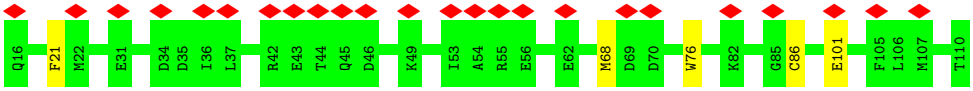


• Molecule 15: Dynein light chain

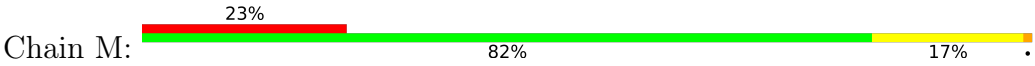


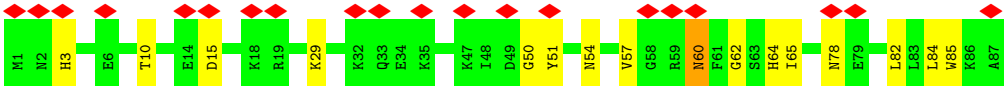
• Molecule 16: Dynein light chain





• Molecule 17: Dynein light chain





4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	191776	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	53.3	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 QUANTUM (4k x 4k)	Depositor
Maximum map value	11.012	Depositor
Minimum map value	0.000	Depositor
Average map value	0.020	Depositor
Map value standard deviation	0.134	Depositor
Recommended contour level	0.8	Depositor
Map size (Å)	530.5338, 477.21387, 449.22086	wwPDB
Map dimensions	398, 358, 337	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.3329996, 1.3329996, 1.3329996	Depositor

5 Model quality

5.1 Standard geometry

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

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$\|Z\|$ >5	RMSZ	#$\|Z\|$ >5
1	A	0.69	0/34464	0.78	1/46623 (0.0%)
2	C	0.68	0/31038	0.77	1/42003 (0.0%)
3	Q	0.86	0/1005	0.84	0/1388
4	B	0.69	1/35205 (0.0%)	0.80	3/47647 (0.0%)
5	I	0.69	0/838	0.77	0/1131
6	H	0.67	0/767	0.76	0/1031
7	G	0.69	0/755	0.77	0/1018
8	F	0.68	0/875	0.77	0/1178
9	N	0.69	0/867	0.79	0/1179
10	O	0.67	0/1004	0.80	0/1349
11	E	0.67	0/4522	0.78	0/6114
12	D	0.66	0/4772	0.78	1/6458 (0.0%)
13	P	0.87	0/538	0.86	0/746
14	L	0.66	0/800	0.76	0/1076
15	K	0.66	0/776	0.73	0/1038
16	J	0.63	0/831	0.74	0/1118
17	M	0.65	0/752	0.76	0/1006
All	All	0.69	1/119809 (0.0%)	0.78	6/162103 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	2
2	C	0	3
4	B	0	4
11	E	0	1
All	All	0	10

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	730	LEU	C-O	5.23	1.33	1.23

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	B	3248	PRO	N-CA-CB	-6.26	95.71	102.60
4	B	533	ARG	CB-CA-C	6.19	122.77	110.40
4	B	1127	ASN	CB-CA-C	5.71	121.82	110.40
12	D	397	ASP	CB-CA-C	5.18	120.76	110.40
1	A	1016	PHE	CB-CA-C	5.13	120.66	110.40

There are no chirality outliers.

5 of 10 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	35	GLU	Peptide
1	A	4250	ARG	Peptide
2	C	2717	ALA	Peptide
2	C	2746	PRO	Peptide
2	C	528	GLU	Peptide

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	33894	0	32288	250	0
2	C	30436	0	29392	239	0
3	Q	1002	0	501	6	0
4	B	34604	0	33094	332	0
5	I	827	0	829	17	0
6	H	750	0	735	7	0
7	G	749	0	772	10	0
8	F	863	0	881	9	0
9	N	855	0	800	12	0
10	O	986	0	1002	12	0
11	E	4423	0	4291	40	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
12	D	4664	0	4484	57	0
13	P	541	0	220	2	0
14	L	783	0	811	10	0
15	K	754	0	716	3	0
16	J	806	0	772	1	0
17	M	735	0	738	9	0
18	A	54	0	24	2	0
18	B	54	0	24	0	0
18	C	54	0	24	3	0
19	A	31	0	12	0	0
19	B	31	0	12	1	0
19	C	31	0	12	0	0
20	A	3	0	0	0	0
20	B	3	0	0	0	0
20	C	3	0	0	0	0
All	All	117936	0	112434	961	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 4.

The worst 5 of 961 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)
4:B:764:GLN:O	4:B:765:PHE:C	1.73	1.26
4:B:764:GLN:O	4:B:766:ILE:N	1.79	1.12
4:B:750:PRO:O	4:B:752:ILE:N	1.89	1.05
4:B:3255:THR:OG1	4:B:3337:CYS:SG	2.13	1.02
2:C:2826:VAL:O	2:C:2829:ASP:N	1.96	0.97

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	4381/4615 (95%)	4081 (93%)	257 (6%)	43 (1%)	15 54
2	C	3915/3943 (99%)	3583 (92%)	283 (7%)	49 (1%)	12 48
3	Q	190/192 (99%)	163 (86%)	24 (13%)	3 (2%)	9 43
4	B	4488/4588 (98%)	4019 (90%)	382 (8%)	87 (2%)	8 40
5	I	104/106 (98%)	95 (91%)	8 (8%)	1 (1%)	15 54
6	H	89/91 (98%)	83 (93%)	6 (7%)	0	100 100
7	G	92/96 (96%)	87 (95%)	5 (5%)	0	100 100
8	F	108/110 (98%)	96 (89%)	11 (10%)	1 (1%)	17 56
9	N	112/114 (98%)	92 (82%)	17 (15%)	3 (3%)	5 33
10	O	118/120 (98%)	104 (88%)	9 (8%)	5 (4%)	3 23
11	E	551/557 (99%)	496 (90%)	51 (9%)	4 (1%)	22 61
12	D	569/595 (96%)	510 (90%)	51 (9%)	8 (1%)	11 46
13	P	103/112 (92%)	86 (84%)	11 (11%)	6 (6%)	1 16
14	L	96/98 (98%)	91 (95%)	4 (4%)	1 (1%)	15 54
15	K	88/90 (98%)	79 (90%)	9 (10%)	0	100 100
16	J	93/95 (98%)	84 (90%)	8 (9%)	1 (1%)	14 52
17	M	85/87 (98%)	72 (85%)	11 (13%)	2 (2%)	6 35
All	All	15182/15609 (97%)	13821 (91%)	1147 (8%)	214 (1%)	15 46

5 of 214 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	125	PRO
1	A	197	ILE
1	A	871	LEU
1	A	973	ASP
1	A	3251	ILE

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	3420/4191 (82%)	3338 (98%)	82 (2%)	49 76
2	C	3149/3501 (90%)	3095 (98%)	54 (2%)	60 82
3	Q	10/176 (6%)	10 (100%)	0	100 100
4	B	3497/4138 (84%)	3399 (97%)	98 (3%)	43 72
5	I	91/91 (100%)	87 (96%)	4 (4%)	28 62
6	H	82/82 (100%)	81 (99%)	1 (1%)	71 87
7	G	86/87 (99%)	85 (99%)	1 (1%)	71 87
8	F	93/93 (100%)	86 (92%)	7 (8%)	13 43
9	N	85/102 (83%)	84 (99%)	1 (1%)	71 87
10	O	106/108 (98%)	99 (93%)	7 (7%)	16 49
11	E	484/496 (98%)	467 (96%)	17 (4%)	36 67
12	D	507/545 (93%)	482 (95%)	25 (5%)	25 59
14	L	87/87 (100%)	83 (95%)	4 (5%)	27 61
15	K	80/80 (100%)	79 (99%)	1 (1%)	69 86
16	J	81/81 (100%)	79 (98%)	2 (2%)	47 75
17	M	78/78 (100%)	74 (95%)	4 (5%)	24 57
All	All	11936/13936 (86%)	11628 (97%)	308 (3%)	49 74

5 of 308 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
4	B	4540	LYS
12	D	392	ASN
6	H	68	PHE
11	E	193	MET
14	L	86	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 143 such sidechains are listed below:

Mol	Chain	Res	Type
4	B	4176	ASN
7	G	129	GLN
11	E	481	GLN
2	C	1428	ASN
2	C	1300	GLN

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)

Of 18 ligands modelled in this entry, 9 are monoatomic - leaving 9 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
18	ADP	C	4801	20	24,29,29	0.65	0	29,45,45	0.87	2 (6%)
18	ADP	B	5501	20	24,29,29	0.70	0	29,45,45	0.96	2 (6%)
18	ADP	C	4401	20	24,29,29	0.69	1 (4%)	29,45,45	1.04	2 (6%)
18	ADP	A	4701	20	24,29,29	0.69	0	29,45,45	0.77	1 (3%)
19	ATP	B	4701	20	26,33,33	0.66	0	31,52,52	0.92	1 (3%)
18	ADP	A	4901	-	24,29,29	0.66	0	29,45,45	0.80	1 (3%)
19	ATP	A	4801	20	26,33,33	0.65	0	31,52,52	0.86	1 (3%)
19	ATP	C	4201	20	26,33,33	0.69	0	31,52,52	0.94	2 (6%)
18	ADP	B	5601	20	24,29,29	0.66	0	29,45,45	0.72	1 (3%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
18	ADP	C	4801	20	-	3/12/32/32	0/3/3/3
18	ADP	B	5501	20	-	5/12/32/32	0/3/3/3
18	ADP	C	4401	20	-	5/12/32/32	0/3/3/3
18	ADP	A	4701	20	-	5/12/32/32	0/3/3/3
19	ATP	B	4701	20	-	2/18/38/38	0/3/3/3
18	ADP	A	4901	-	-	1/12/32/32	0/3/3/3
19	ATP	A	4801	20	-	5/18/38/38	0/3/3/3
19	ATP	C	4201	20	-	4/18/38/38	0/3/3/3
18	ADP	B	5601	20	-	3/12/32/32	0/3/3/3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
18	C	4401	ADP	C8-N7	-2.07	1.31	1.34

The worst 5 of 13 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
18	C	4401	ADP	C1'-N9-C4	2.72	131.41	126.64
19	C	4201	ATP	PA-O3A-PB	-2.45	124.44	132.83
19	B	4701	ATP	C5-C6-N6	2.42	124.04	120.35
19	A	4801	ATP	C5-C6-N6	2.22	123.73	120.35
18	C	4801	ADP	C5-C6-N6	2.20	123.69	120.35

There are no chirality outliers.

5 of 33 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
18	A	4701	ADP	PA-O3A-PB-O3B
18	C	4401	ADP	C5'-O5'-PA-O1A
18	C	4401	ADP	C5'-O5'-PA-O2A
18	C	4801	ADP	O4'-C4'-C5'-O5'
18	B	5501	ADP	PB-O3A-PA-O5'

There are no ring outliers.

5 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
18	C	4801	ADP	2	0
18	C	4401	ADP	1	0

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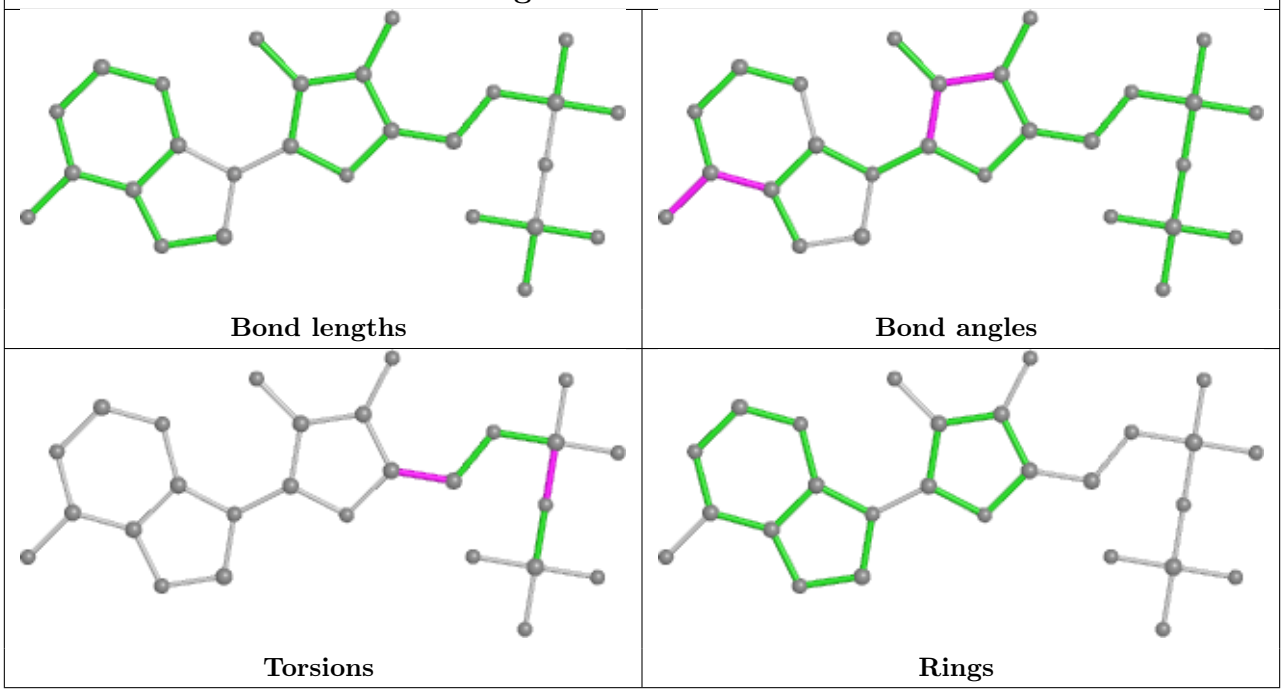
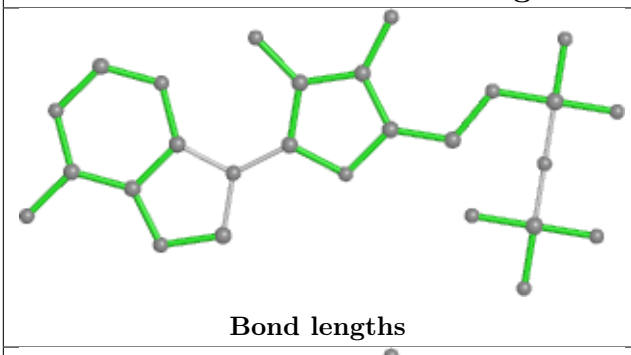
Mol	Chain	Res	Type	Clashes	Symm-Clashes
18	A	4701	ADP	1	0
19	B	4701	ATP	1	0
18	A	4901	ADP	1	0

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

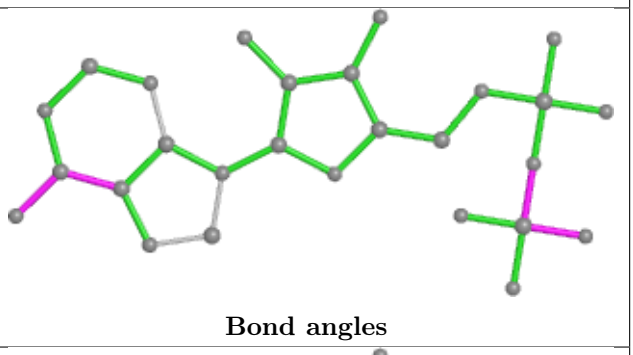
Ligand ADP C 4801



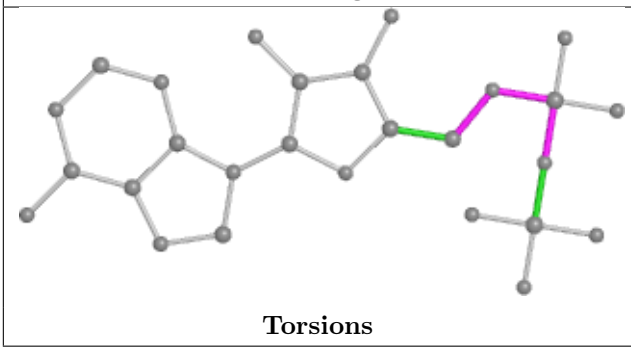
Ligand ADP B 5501



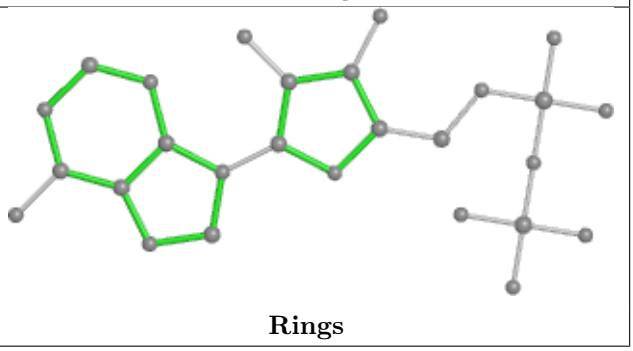
Bond lengths



Bond angles

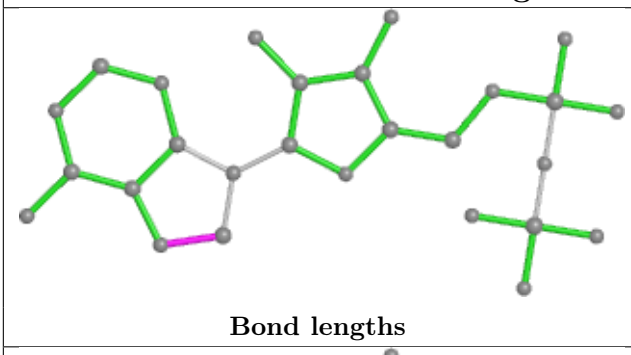


Torsions

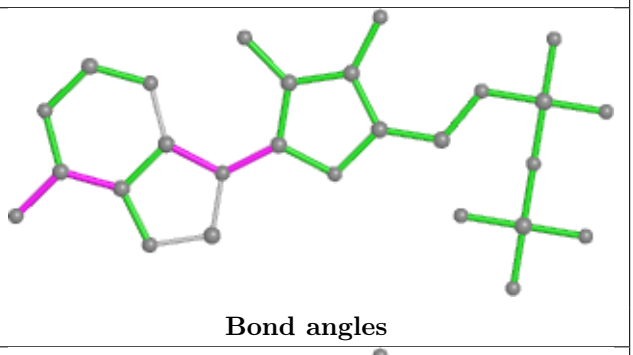


Rings

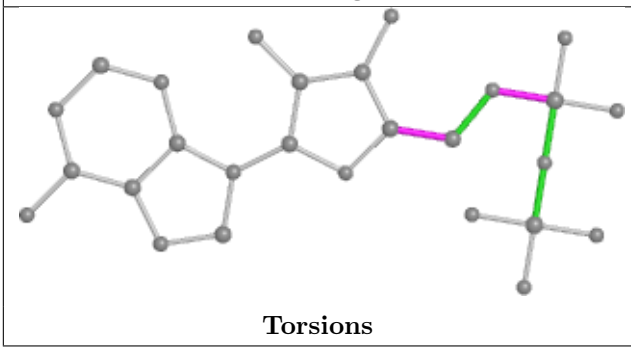
Ligand ADP C 4401



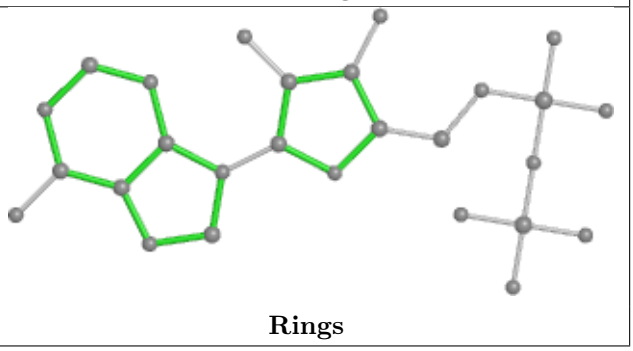
Bond lengths



Bond angles

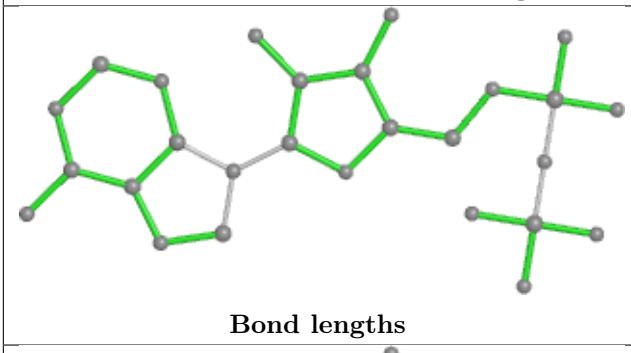


Torsions

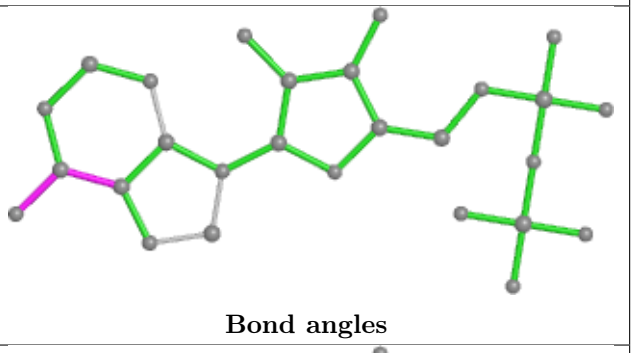


Rings

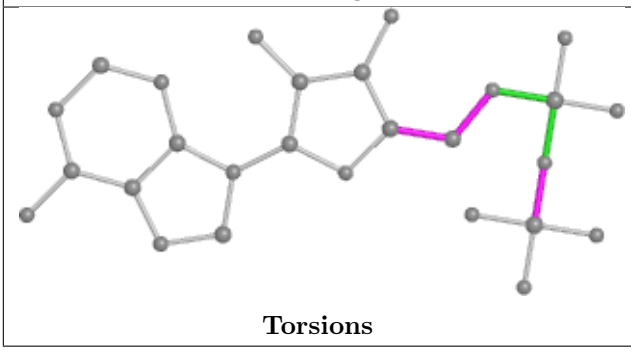
Ligand ADP A 4701



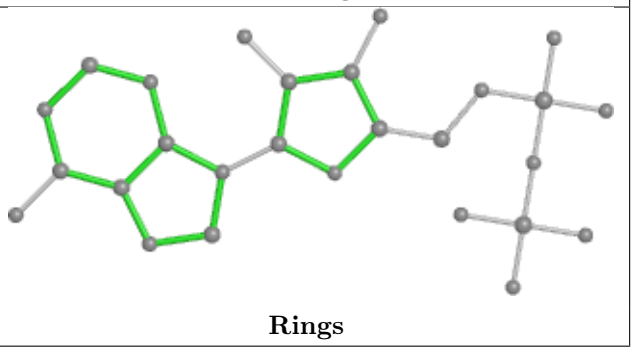
Bond lengths



Bond angles

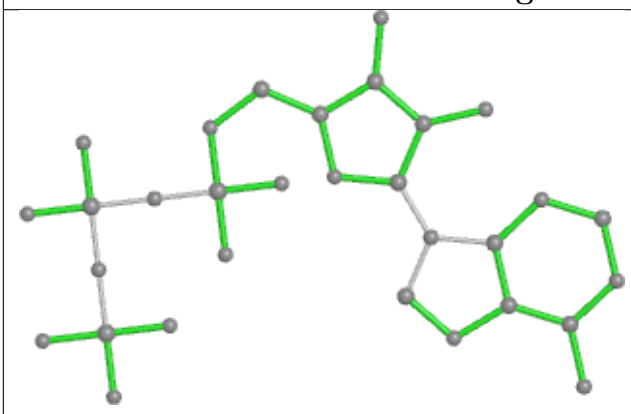


Torsions

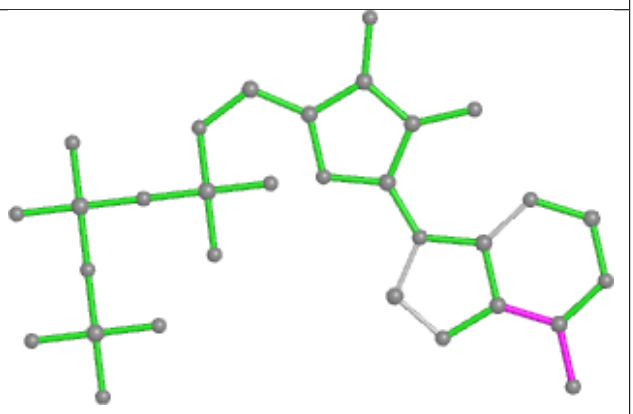


Rings

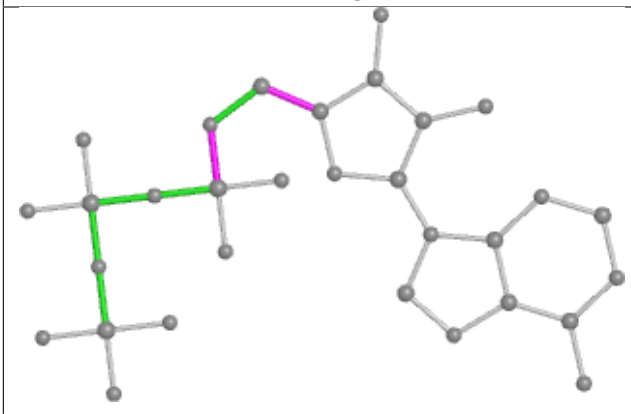
Ligand ATP B 4701



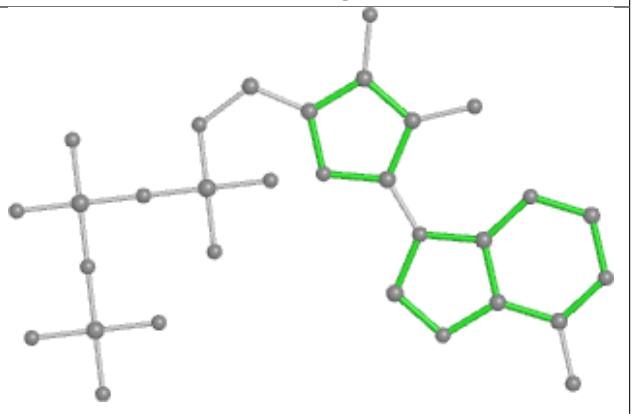
Bond lengths



Bond angles

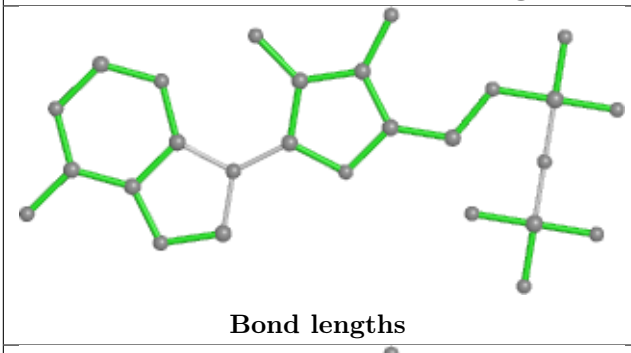


Torsions

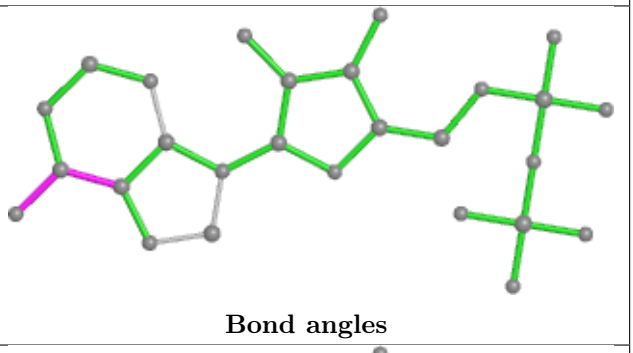


Rings

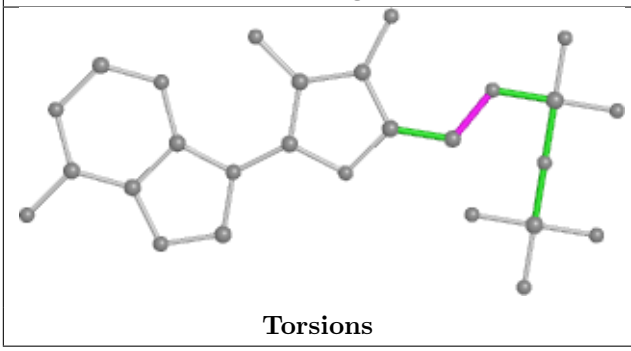
Ligand ADP A 4901



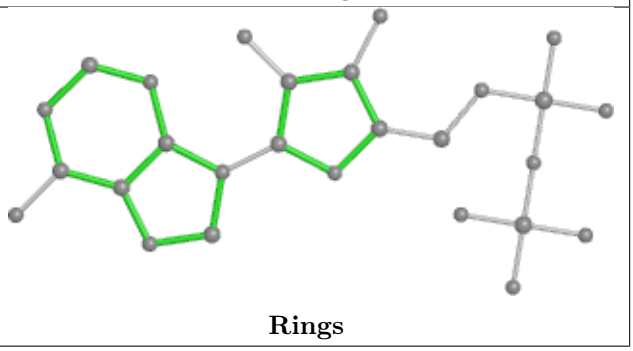
Bond lengths



Bond angles

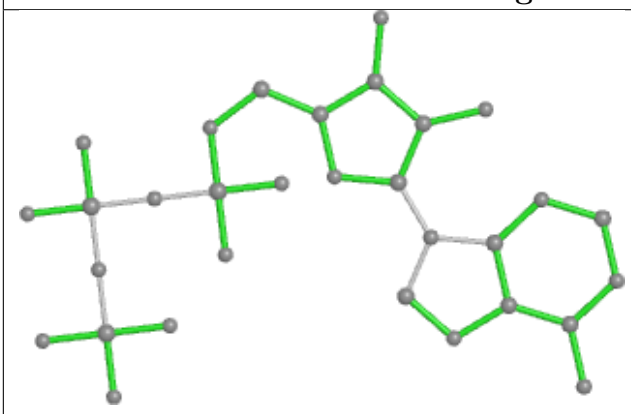


Torsions

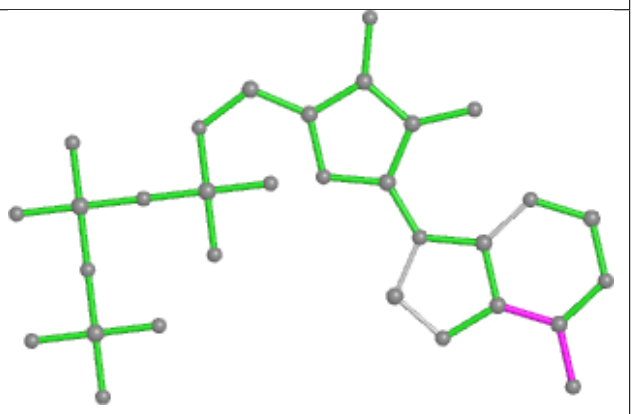


Rings

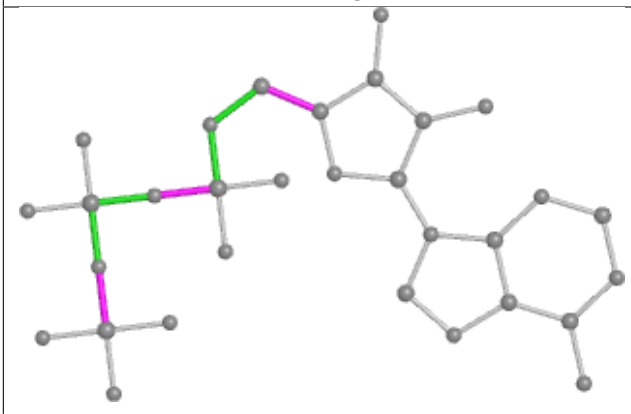
Ligand ATP A 4801



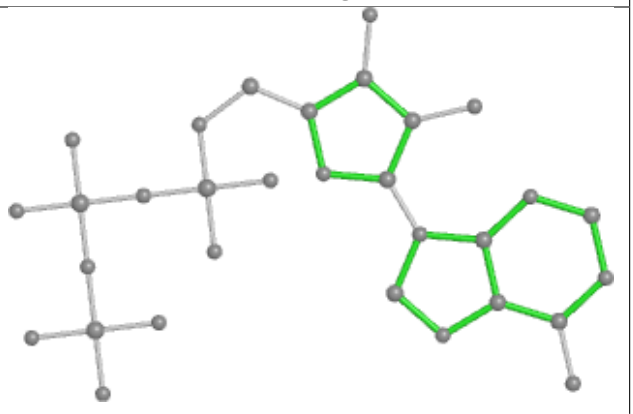
Bond lengths



Bond angles

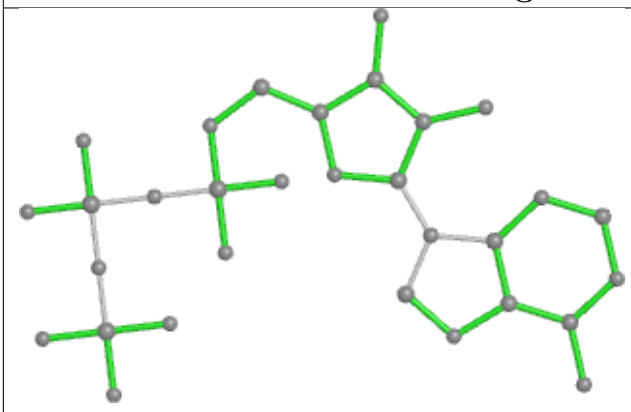


Torsions

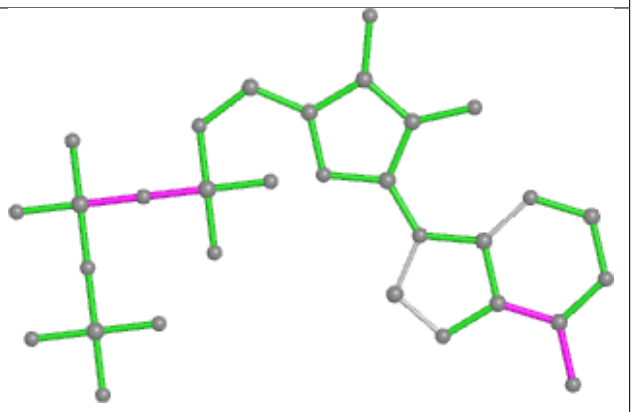


Rings

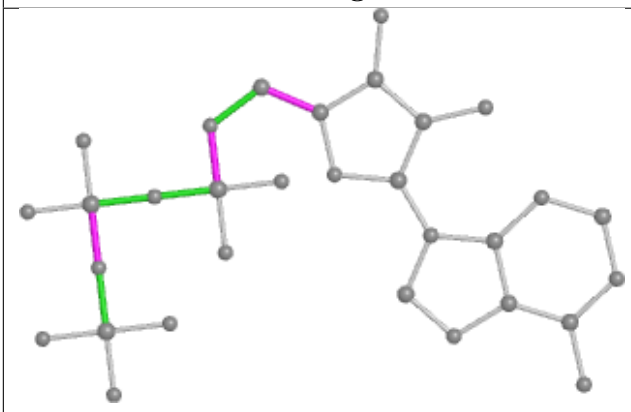
Ligand ATP C 4201



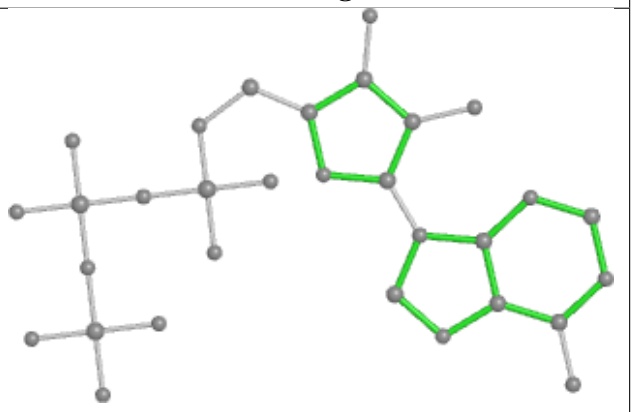
Bond lengths



Bond angles

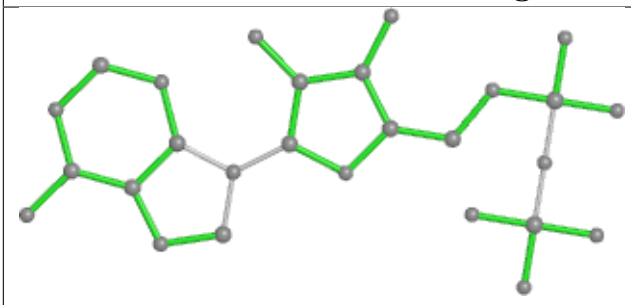


Torsions

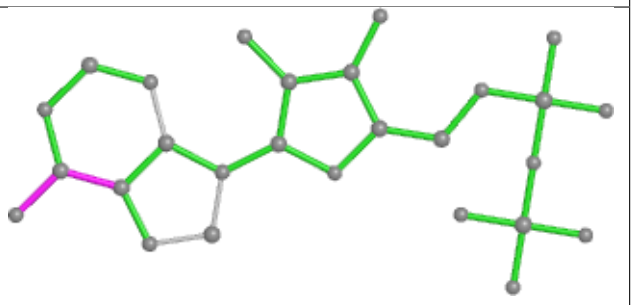


Rings

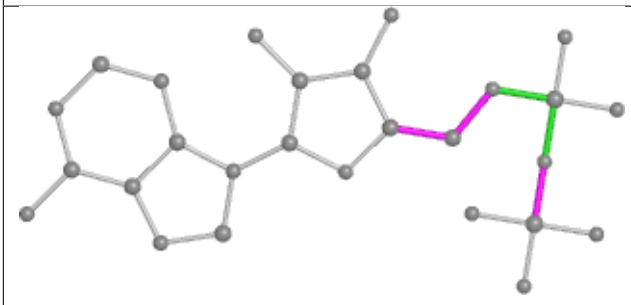
Ligand ADP B 5601



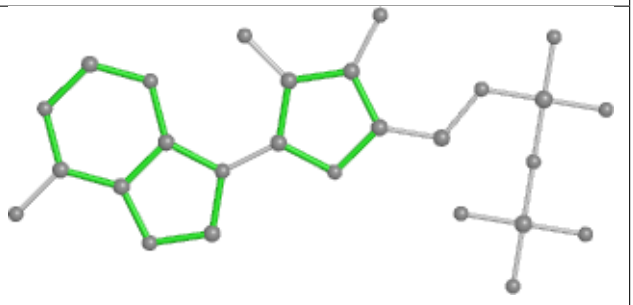
Bond lengths



Bond angles



Torsions



Rings

5.7 Other polymers

There are no such residues in this entry.

5.8 Polymer linkage issues

The following chains have linkage breaks:

Mol	Chain	Number of breaks
2	C	13
1	A	6
4	B	2
12	D	2
13	P	1
7	G	1

The worst 5 of 25 chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	C	3277:MET	C	3380:MET	N	42.35
1	C	809:ARG	C	818:ILE	N	14.24
1	A	1235:PRO	C	1246:MET	N	12.91
1	C	665:ILE	C	670:SER	N	11.42
1	C	449:TYR	C	453:THR	N	10.61

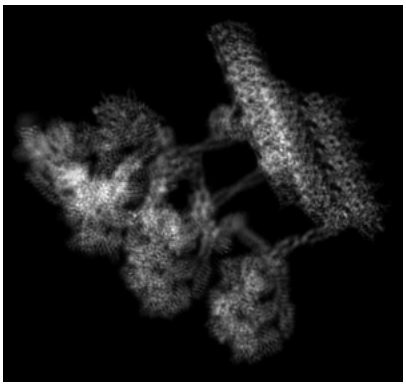
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-22677. These allow visual inspection of the internal detail of the map and identification of artifacts.

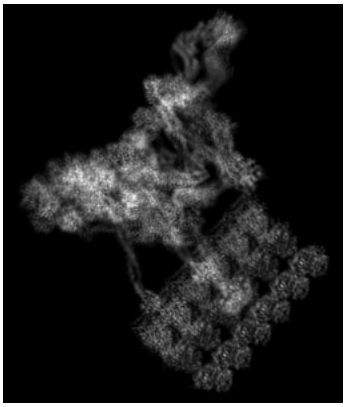
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections

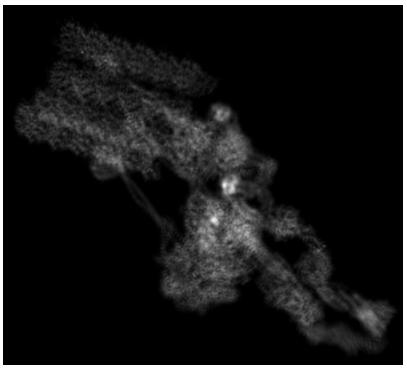
6.1.1 Primary map



X



Y

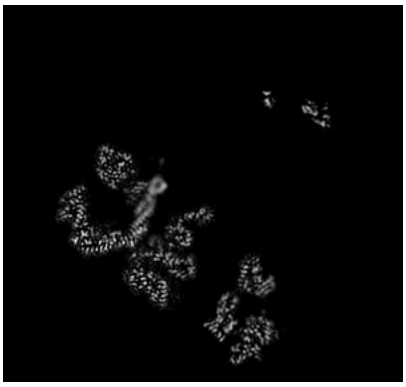


Z

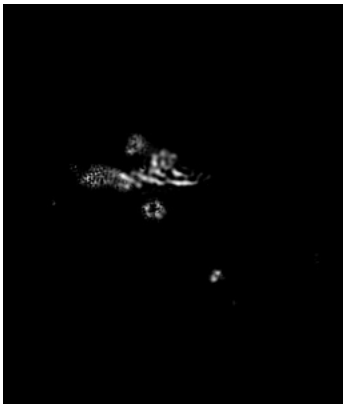
The images above show the map projected in three orthogonal directions.

6.2 Central slices

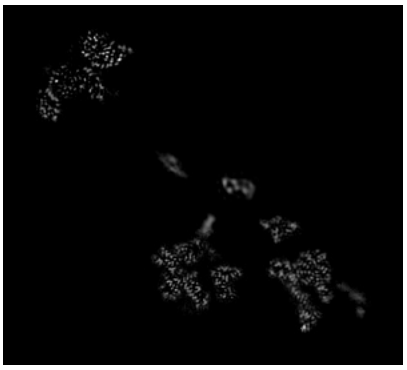
6.2.1 Primary map



X Index: 199



Y Index: 179

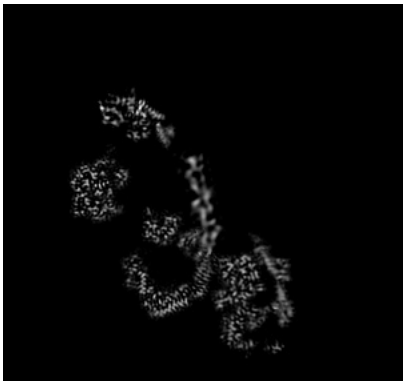


Z Index: 168

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

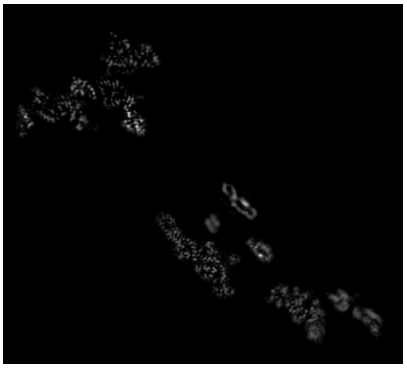
6.3 Largest variance slices (i)

6.3.1 Primary map



X Index: 222

Y Index: 223

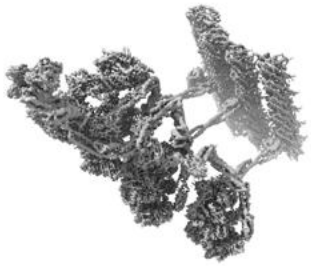


Z Index: 191

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

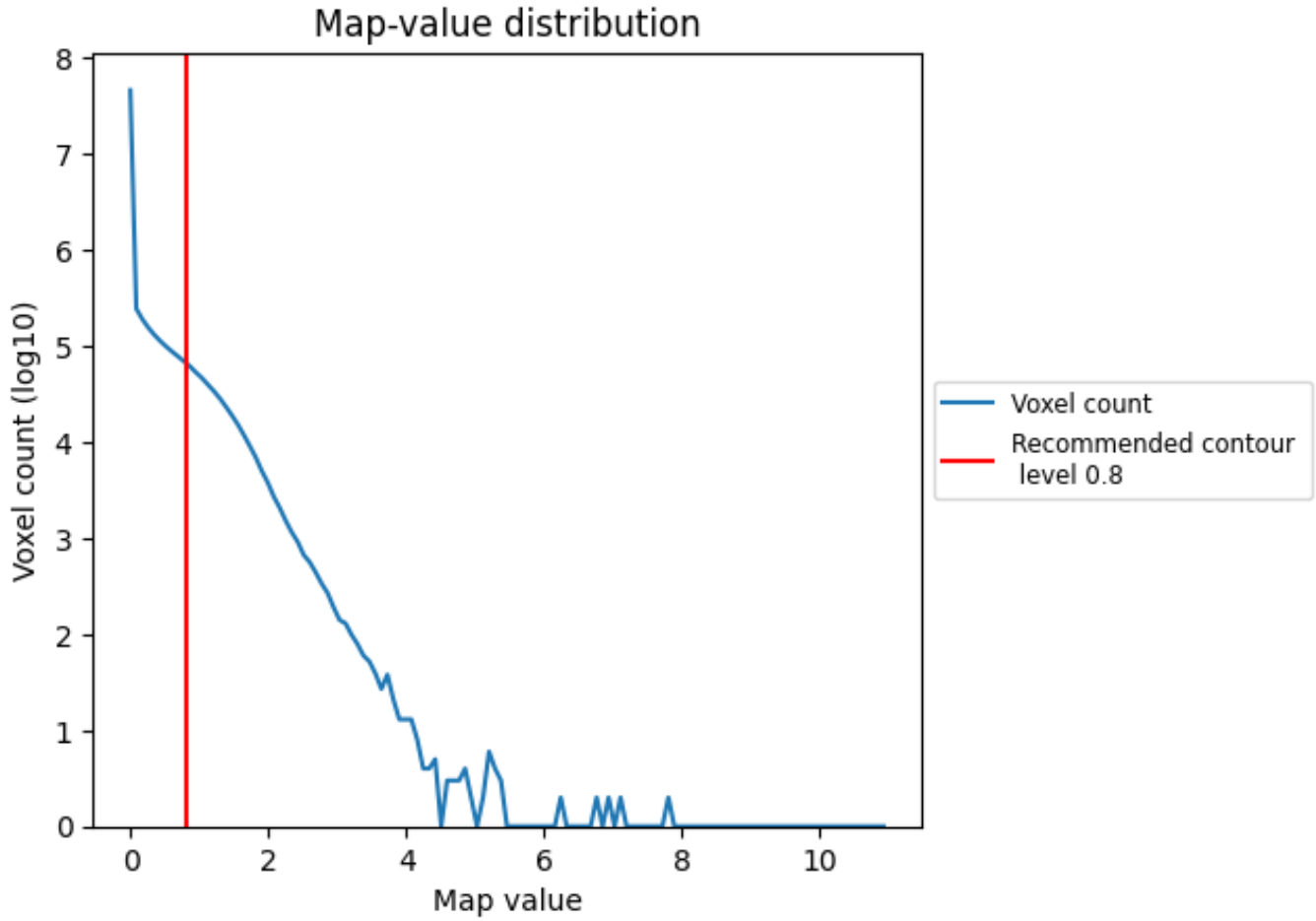
6.5 Mask visualisation (i)

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

7 Map analysis

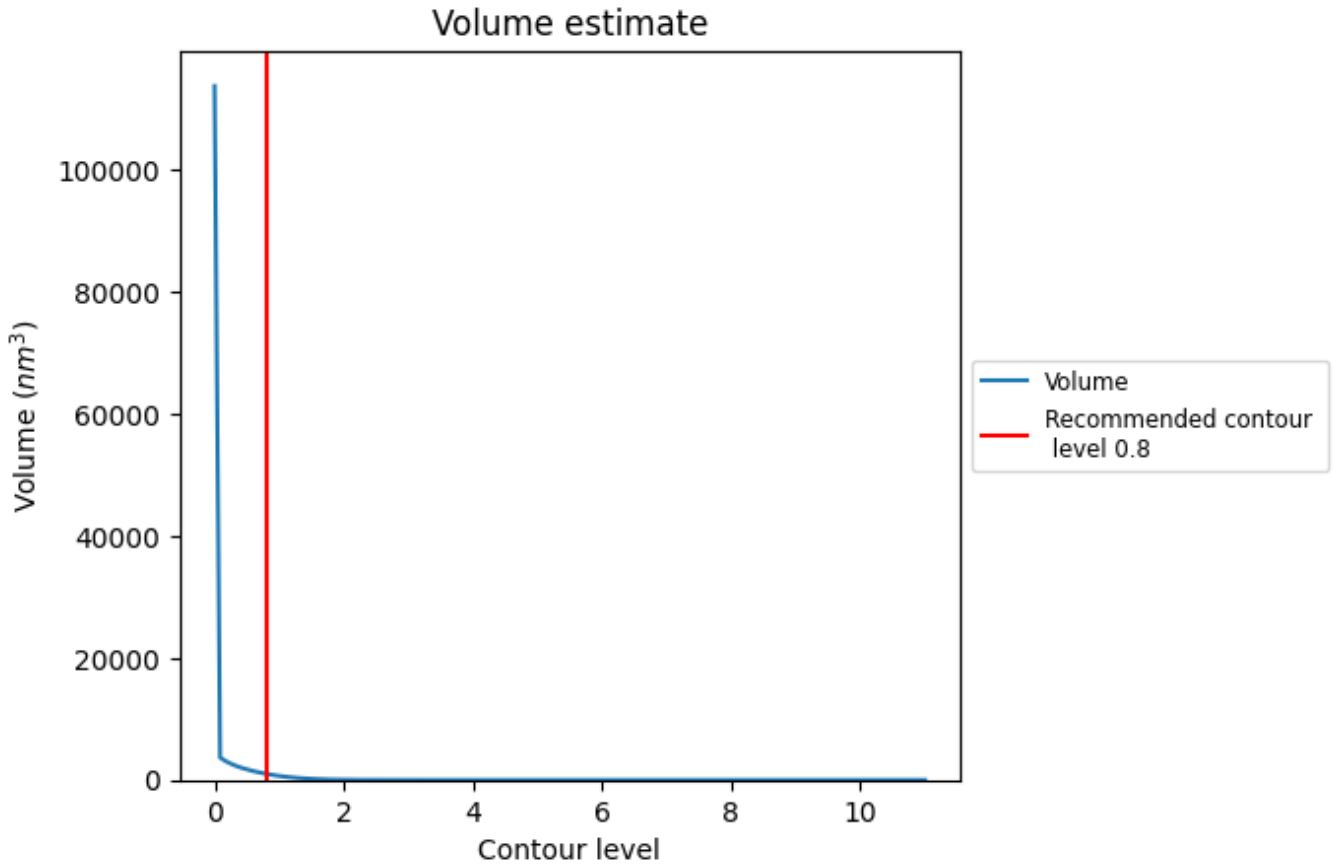
This section contains the results of statistical analysis of the map.

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 1003 nm^3; this corresponds to an approximate mass of 906 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)

This section was not generated. The rotationally averaged power spectrum is only generated for cubic maps.

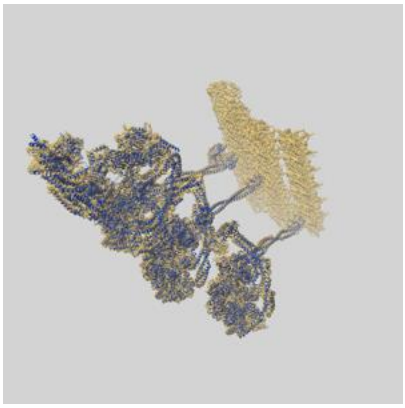
8 Fourier-Shell correlation (i)

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

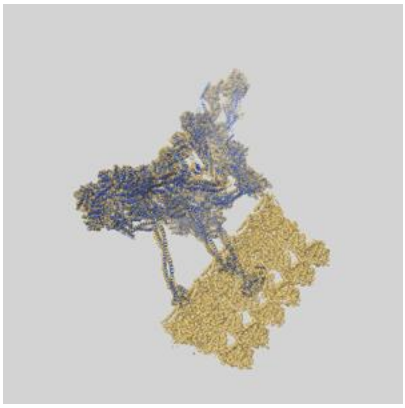
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-22677 and PDB model 7K58. Per-residue inclusion information can be found in section 3 on page 9.

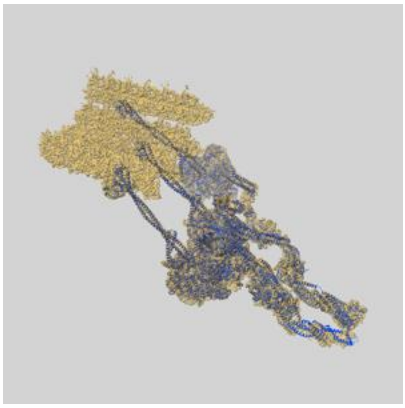
9.1 Map-model overlay



X



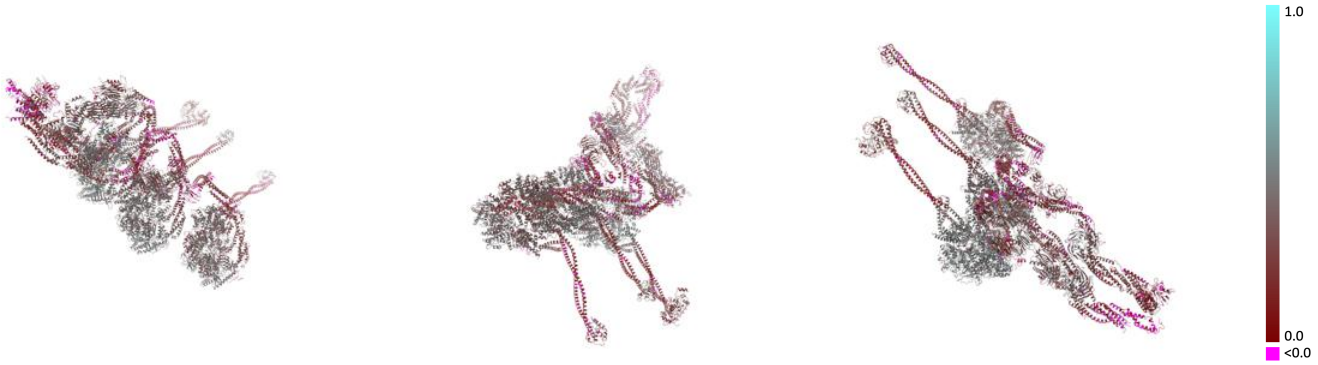
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.8 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.

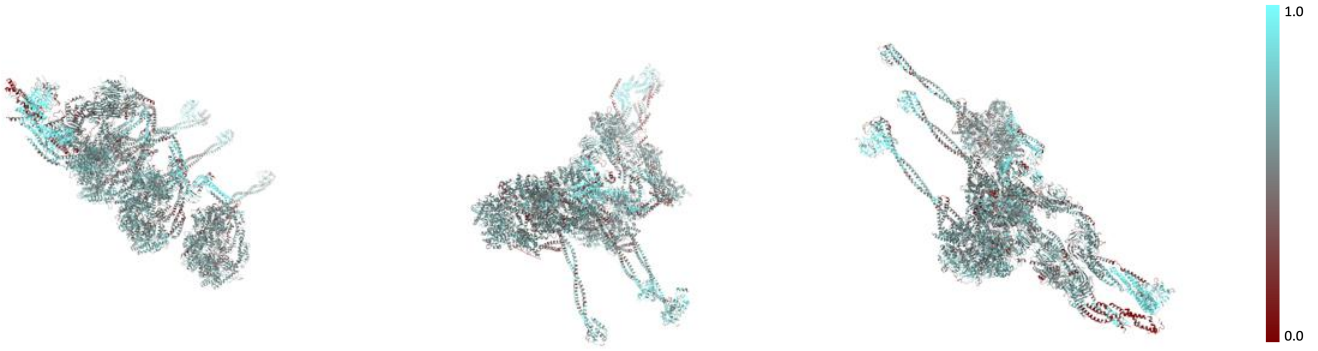
9.2 Q-score mapped to coordinate model (i)



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.

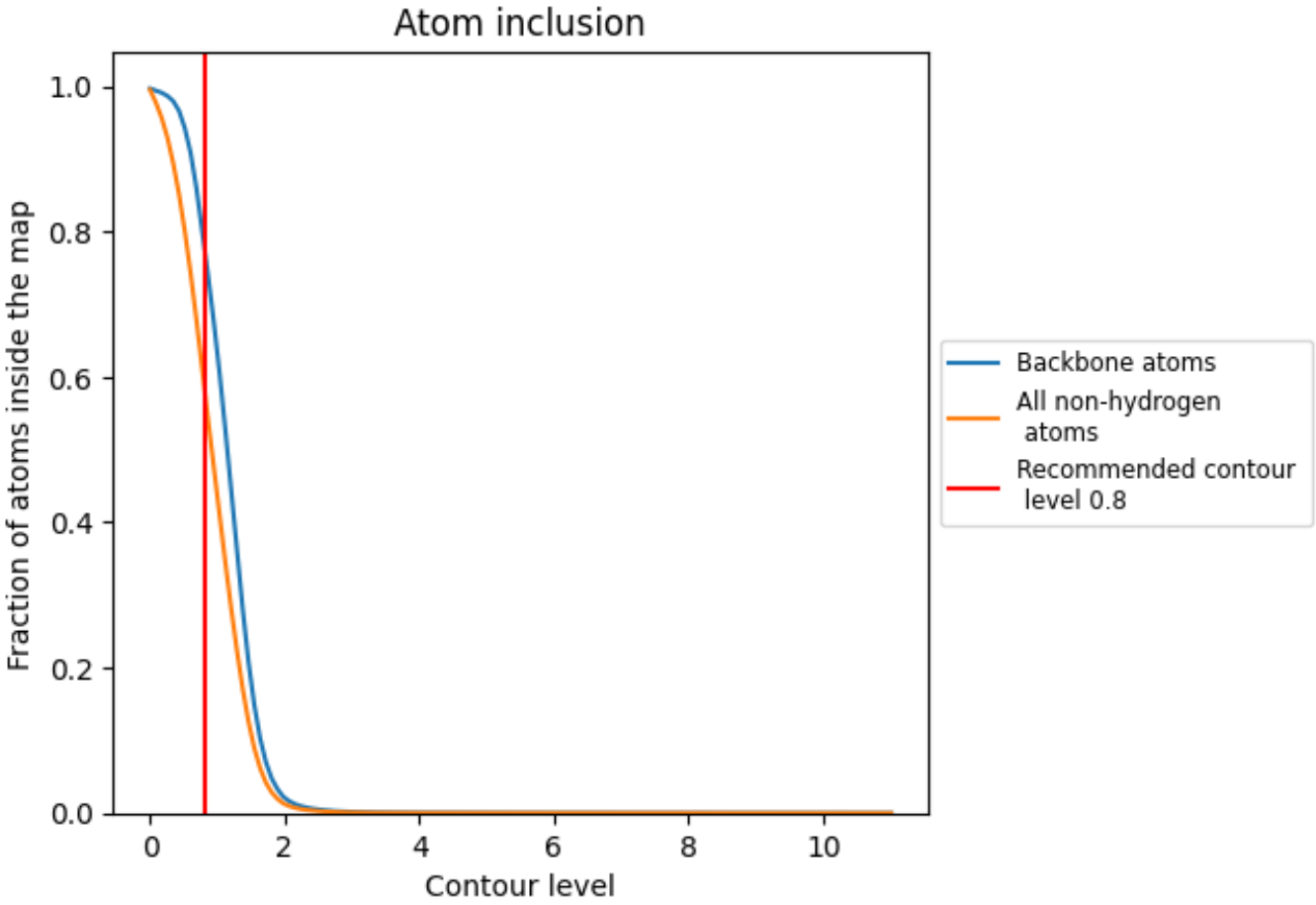
9.3 Atom inclusion mapped to coordinate model (i)



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 (0.8).

9.4 Atom inclusion (i)



At the recommended contour level, 78% of all backbone atoms, 59% 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 (0.8) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.5895	0.3570
A	0.6015	0.3820
B	0.6170	0.3590
C	0.5698	0.3380
D	0.5985	0.3420
E	0.5229	0.3550
F	0.5182	0.3830
G	0.4553	0.3710
H	0.4857	0.3550
I	0.5256	0.3180
J	0.5367	0.3860
K	0.4752	0.3630
L	0.4137	0.3650
M	0.5180	0.3810
N	0.5697	0.2740
O	0.5115	0.2540
P	0.5564	0.1490
Q	0.7986	0.3230