wwPDB EM Validation Summary Report (i)

Nov 25, 2024 – 10:56 AM JST

PDB ID	:	8XKS
EMDB ID	:	EMD-38424
Title	:	The cryo-EM structure of Orf2971-FtsHi motor complex
Authors	:	Wang, N.; Li, M.
Deposited on	:	2023-12-24
Resolution	:	3.20 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 (i) 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 (i)) were used in the production of this report:

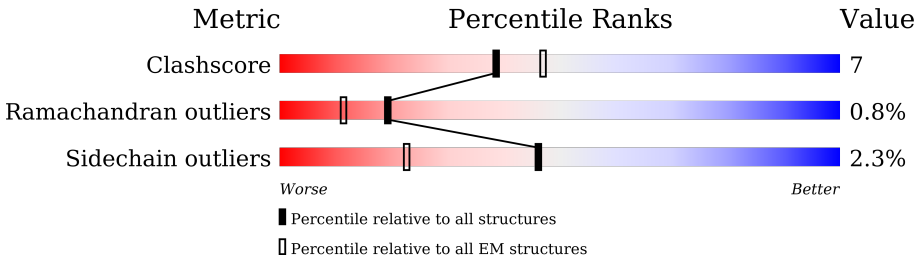
EMDB validation analysis	:	0.0.1.dev113
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

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 3.20 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 <=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	982	5% 59% 13% • 27%
2	B	1024	7% 49% 9% • 41%
3	C	462	• 69% 14% • 15%
4	D	1178	5% 66% 16% • 18%
5	E	2971	• 38% 11% • 51%
6	F	1058	• 50% 13% • 36%
6	G	1058	• 51% 12% • 36%
7	H	691	• 57% 15% 28%

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Mol	Chain	Length	Quality of chain
8	I	330	53% 8% 38%
9	J	365	61% 13% 25%
10	K	682	45% 9% 46%
11	L	255	57% 15% 27%
12	M	303	39% 5% 55%
13	N	324	29% 9% 61%
14	O	471	6% 37% 58%
15	P	555	59% 13% 27%
16	Q	495	9% 67% 10% 22%
17	R	117	50% 21% 27%
18	S	137	66% 15% 17%
19	T	299	8% 29% 6% 64%

2 Entry composition (i)

There are 25 unique types of molecules in this entry. The entry contains 67528 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 Ctap1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	715	5557	3504	1001	1038	14	0	0

- Molecule 2 is a protein called Fhl2.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	603	4588	2880	830	859	19	0	0

- Molecule 3 is a protein called 4Fe-4S ferredoxin-type domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	C	391	3085	1940	555	569	21	0	0

- Molecule 4 is a protein called AAA+ ATPase domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	D	971	7551	4796	1323	1396	36	0	0

- Molecule 5 is a protein called Uncharacterized 341.7 kDa protein in psbD-psbC intergenic region.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
5	E	1458	12035	7819	2048	2142	26	0	0

- Molecule 6 is a protein called AAA+ ATPase domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
6	F	676	5216	3291	927	967	31	0	0

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Mol	Chain	Residues	Atoms					AltConf	Trace
6	G	674	Total	C	N	O	S	0	0
			5260	3327	928	977	28		

- Molecule 7 is a protein called Flagellar associated protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
7	H	500	Total	C	N	O	S	0	0
			3670	2289	681	690	10		

- Molecule 8 is a protein called Tic22.

Mol	Chain	Residues	Atoms					AltConf	Trace
8	I	204	Total	C	N	O	S	0	0
			1619	1035	277	298	9		

- Molecule 9 is a protein called FaxL.

Mol	Chain	Residues	Atoms					AltConf	Trace
9	J	274	Total	C	N	O	S	0	0
			2101	1326	393	368	14		

- Molecule 10 is a protein called Fatty acid desaturase domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
10	K	370	Total	C	N	O	S	0	0
			2853	1866	486	485	16		

- Molecule 11 is a protein called Moc25.

Mol	Chain	Residues	Atoms					AltConf	Trace
11	L	185	Total	C	N	O	S	0	0
			1541	1017	267	250	7		

- Molecule 12 is a protein called Moc29.

Mol	Chain	Residues	Atoms					AltConf	Trace
12	M	135	Total	C	N	O	S	0	0
			1127	762	185	176	4		

- Molecule 13 is a protein called Moc34.

Mol	Chain	Residues	Atoms					AltConf	Trace
13	N	125	Total	C	N	O	S	0	0
			1005	627	181	196	1		

- Molecule 14 is a protein called Moc45.

Mol	Chain	Residues	Atoms					AltConf	Trace
14	O	197	Total	C	N	O	S	0	0
			1517	1012	246	253	6		

- Molecule 15 is a protein called PcyA1.

Mol	Chain	Residues	Atoms					AltConf	Trace
15	P	406	Total	C	N	O	S	0	0
			3245	2061	547	616	21		

- Molecule 16 is a protein called ADP-ribosylglycohydrolase.

Mol	Chain	Residues	Atoms					AltConf	Trace
16	Q	386	Total	C	N	O	S	0	0
			2880	1811	531	534	4		

- Molecule 17 is a protein called Acyl carrier protein.

Mol	Chain	Residues	Atoms						AltConf	Trace
17	R	85	Total	C	N	O	P	S	0	0
			633	393	99	137	1	3		

- Molecule 18 is a protein called Moc13.

Mol	Chain	Residues	Atoms					AltConf	Trace
18	S	114	Total	C	N	O	S	0	0
			909	579	168	159	3		

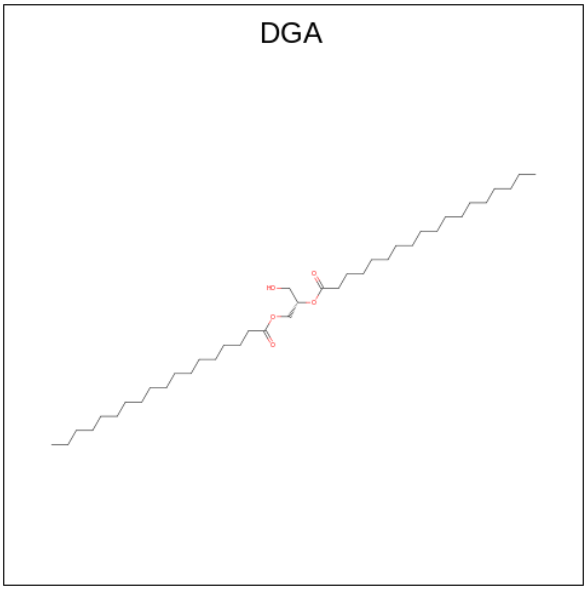
- Molecule 19 is a protein called Moc31.

Mol	Chain	Residues	Atoms					AltConf	Trace
19	T	107	Total	C	N	O	S	0	0
			840	524	144	170	2		

- Molecule 20 is ZINC ION (three-letter code: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

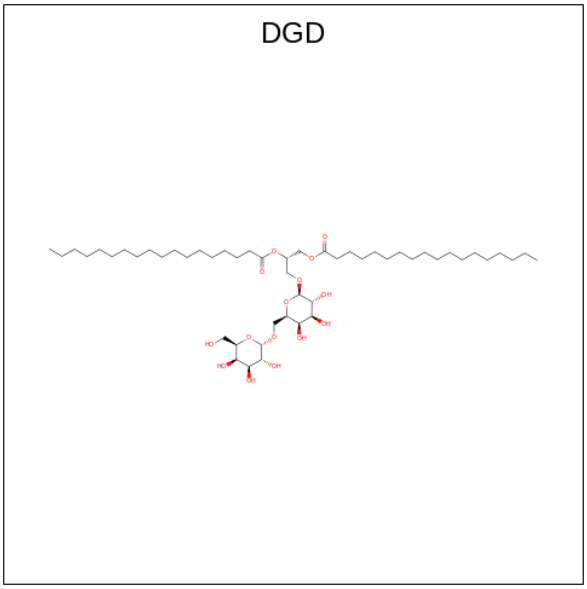
Mol	Chain	Residues	Atoms		AltConf
20	C	2	Total	Zn	0
			2	2	

- Molecule 21 is DIACYL GLYCEROL (three-letter code: DGA) (formula: $C_{39}H_{76}O_5$) (labeled as "Ligand of Interest" by depositor).



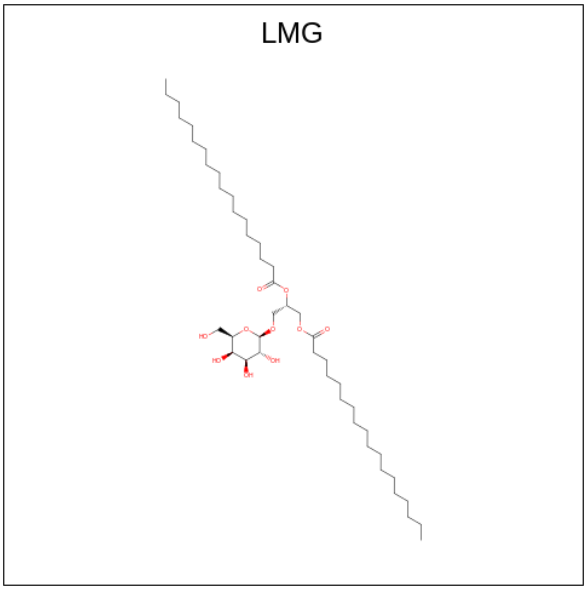
Mol	Chain	Residues	Atoms			AltConf
21	H	1	Total	C	O	0
			36	31	5	

- Molecule 22 is DIGALACTOSYL DIACYL GLYCEROL (DGDG) (three-letter code: DGD) (formula: $C_{51}H_{96}O_{15}$).



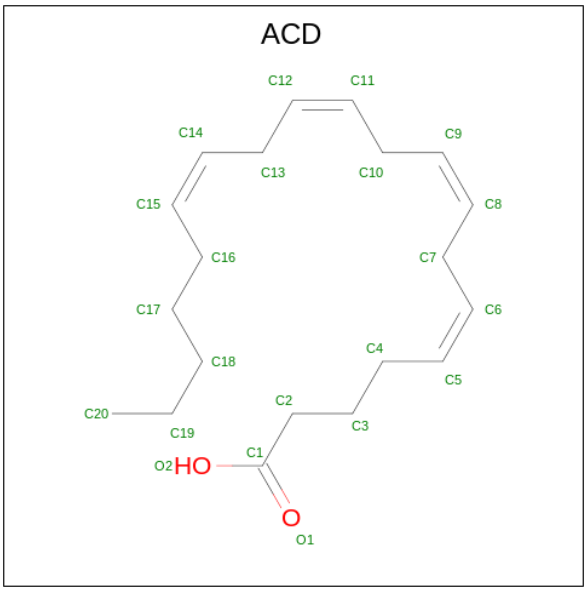
Mol	Chain	Residues	Atoms			AltConf
22	J	1	Total 47	C 32	O 15	0
22	L	1	Total 66	C 51	O 15	0

- Molecule 23 is 1,2-DISTEAROYL-MONOGALACTOSYL-DIGLYCERIDE (three-letter code: LMG) (formula: $C_{45}H_{86}O_{10}$).



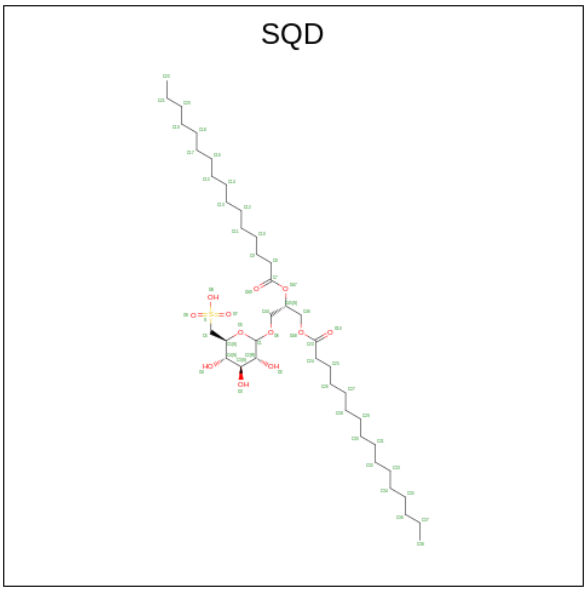
Mol	Chain	Residues	Atoms			AltConf
23	J	1	Total 41	C 31	O 10	0
23	L	1	Total 47	C 37	O 10	0

- Molecule 24 is ARACHIDONIC ACID (three-letter code: ACD) (formula: $C_{20}H_{32}O_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			AltConf
			Total	C	O	
24	K	1	21	20	1	0

- Molecule 25 is 1,2-DI-O-ACYL-3-O-[6-DEOXY-6-SULFO-ALPHA-D-GLUCOPYRANOSYL]-SN-GLYCEROL (three-letter code: SQD) (formula: $C_{41}H_{78}O_{12}S$).



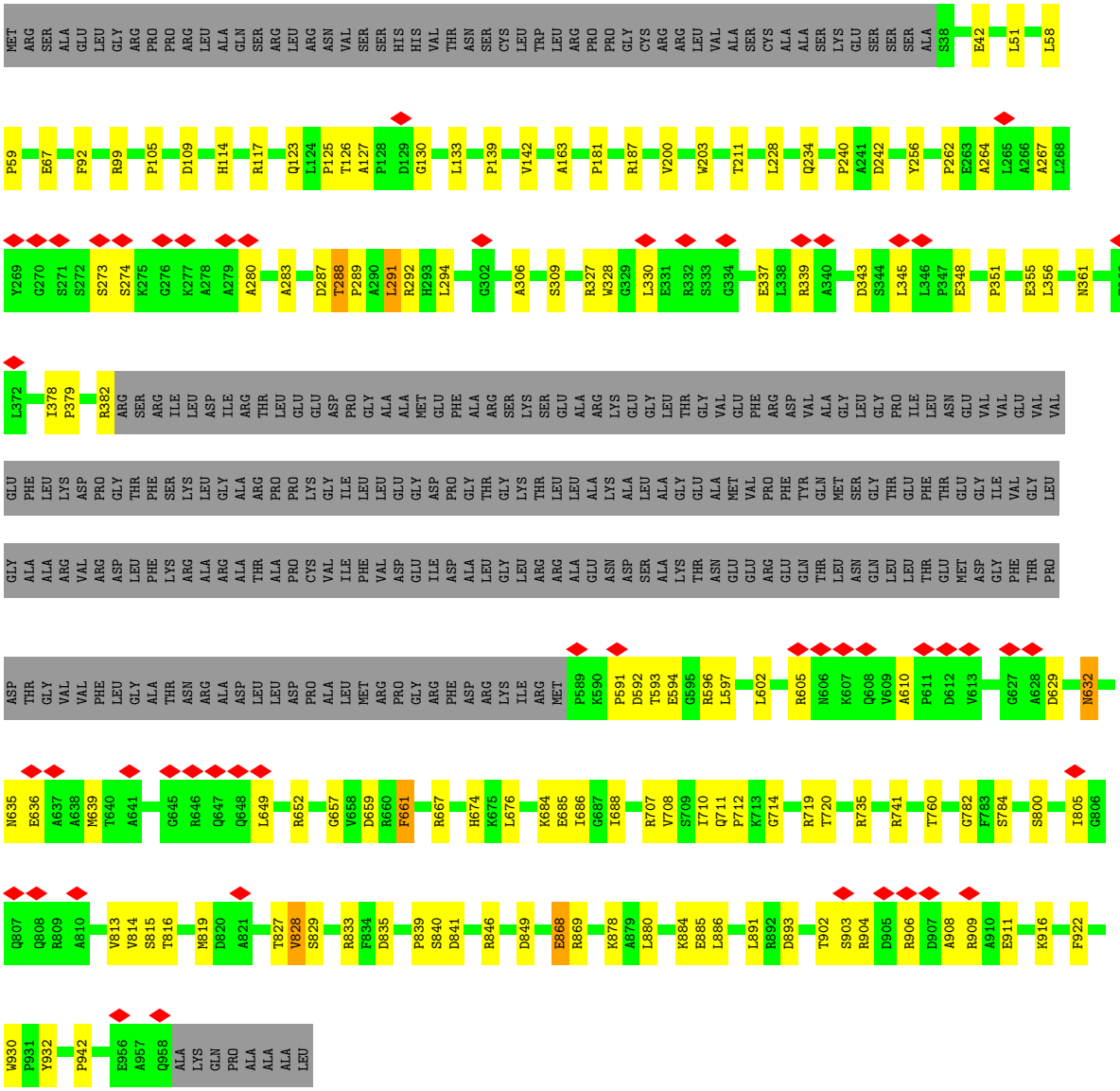
Mol	Chain	Residues	Atoms				AltConf
			Total	C	O	S	
25	L	1	36	23	12	1	0

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.

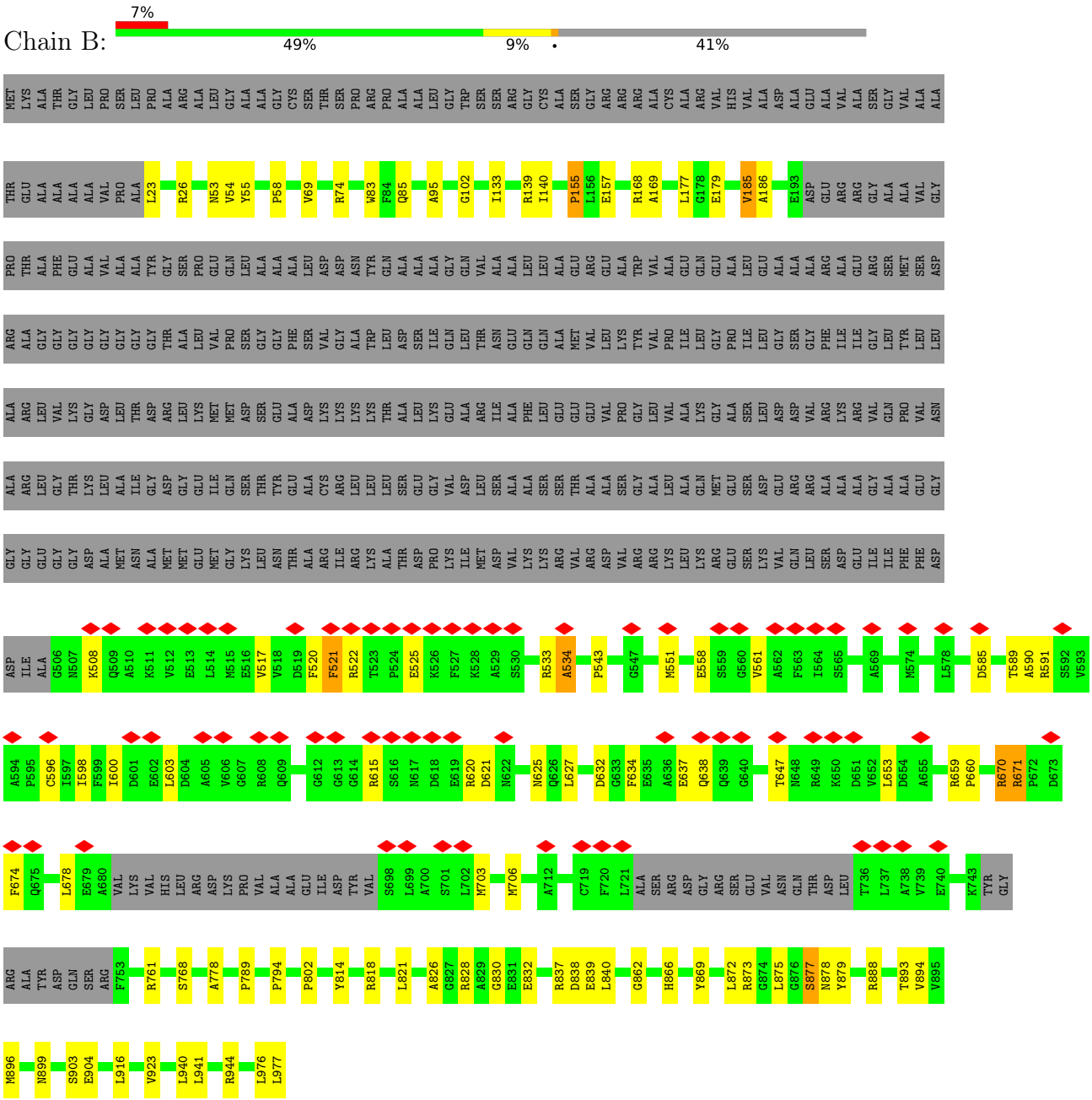
- Molecule 1: Ctap1

Chain A:



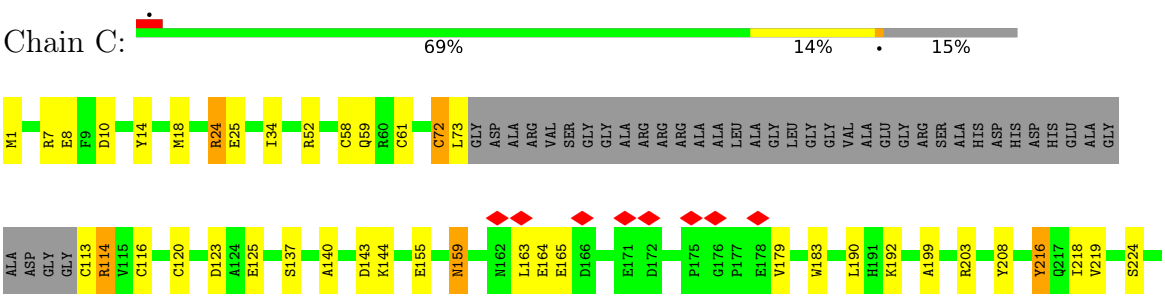
• Molecule 2: Fhl2

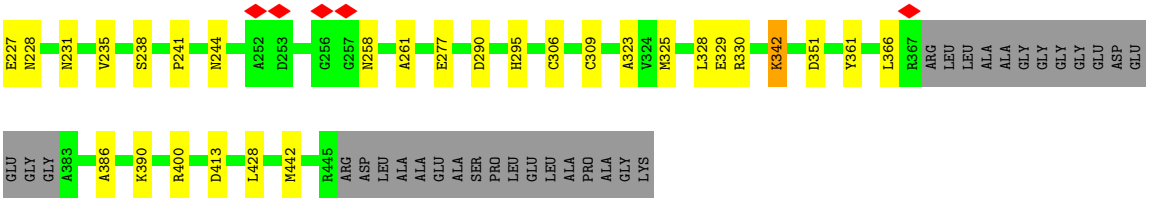
Chain B:



• Molecule 3: 4Fe-4S ferredoxin-type domain-containing protein

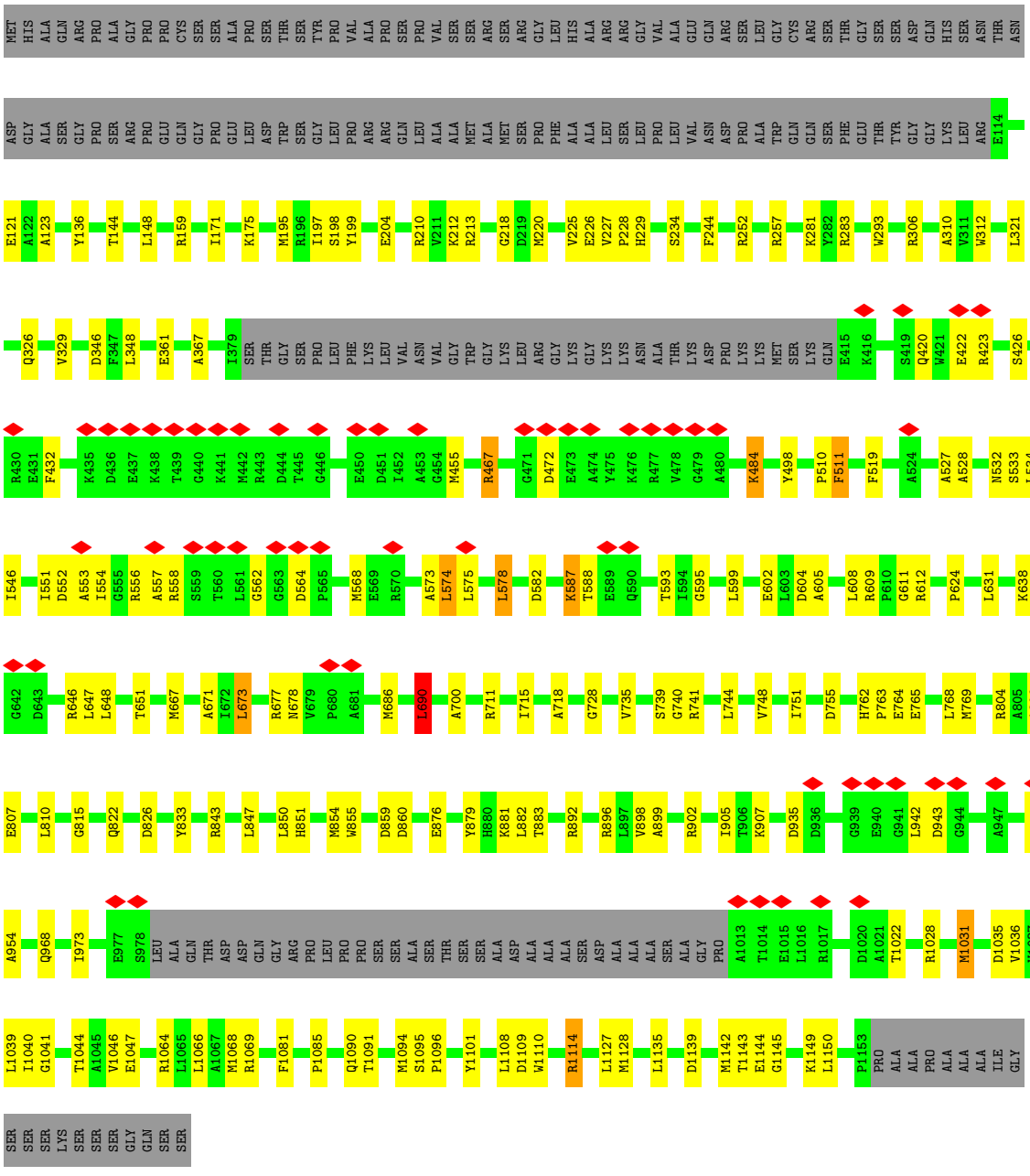
Chain C:





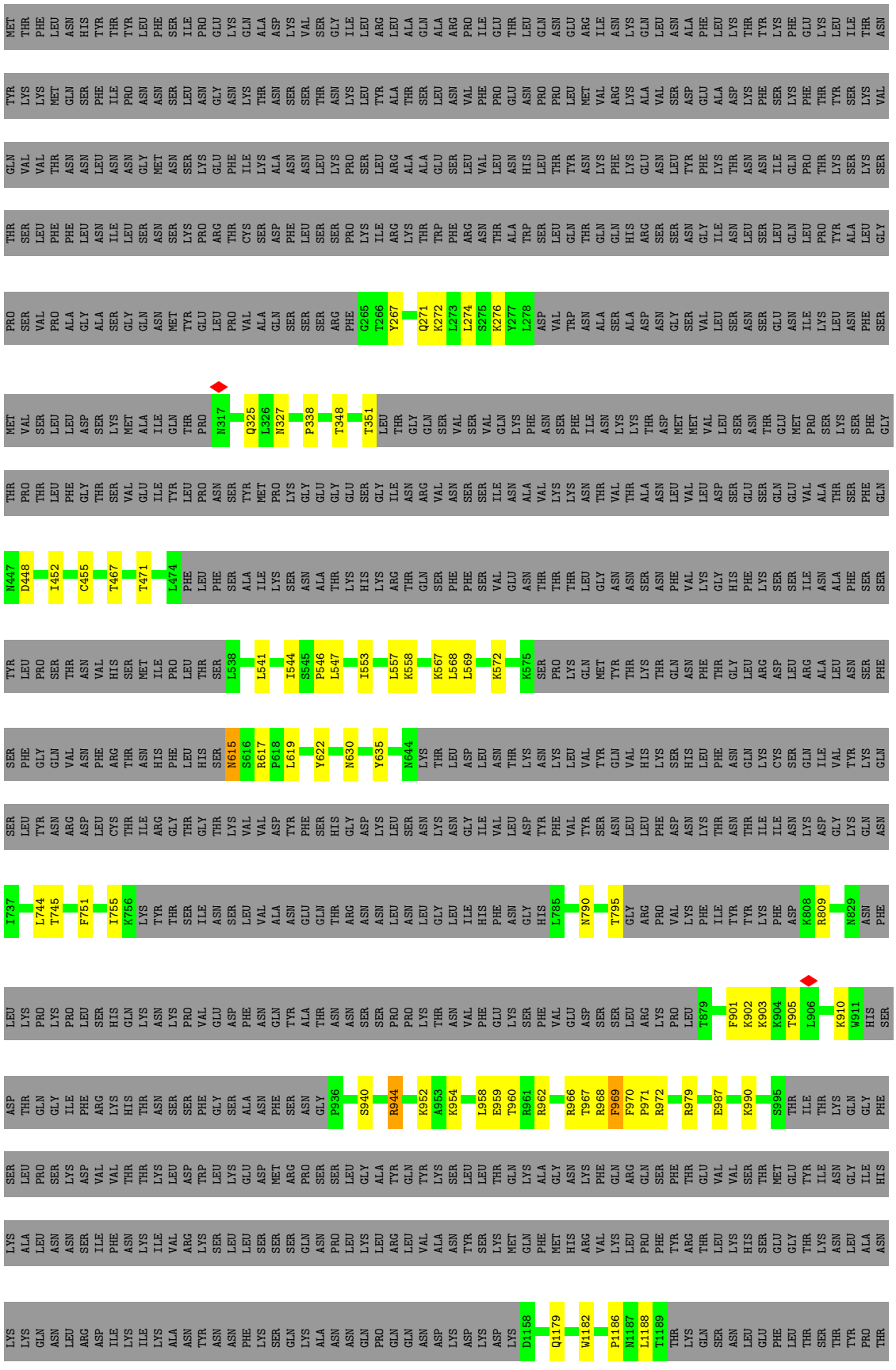
• Molecule 4: AAA+ ATPase domain-containing protein

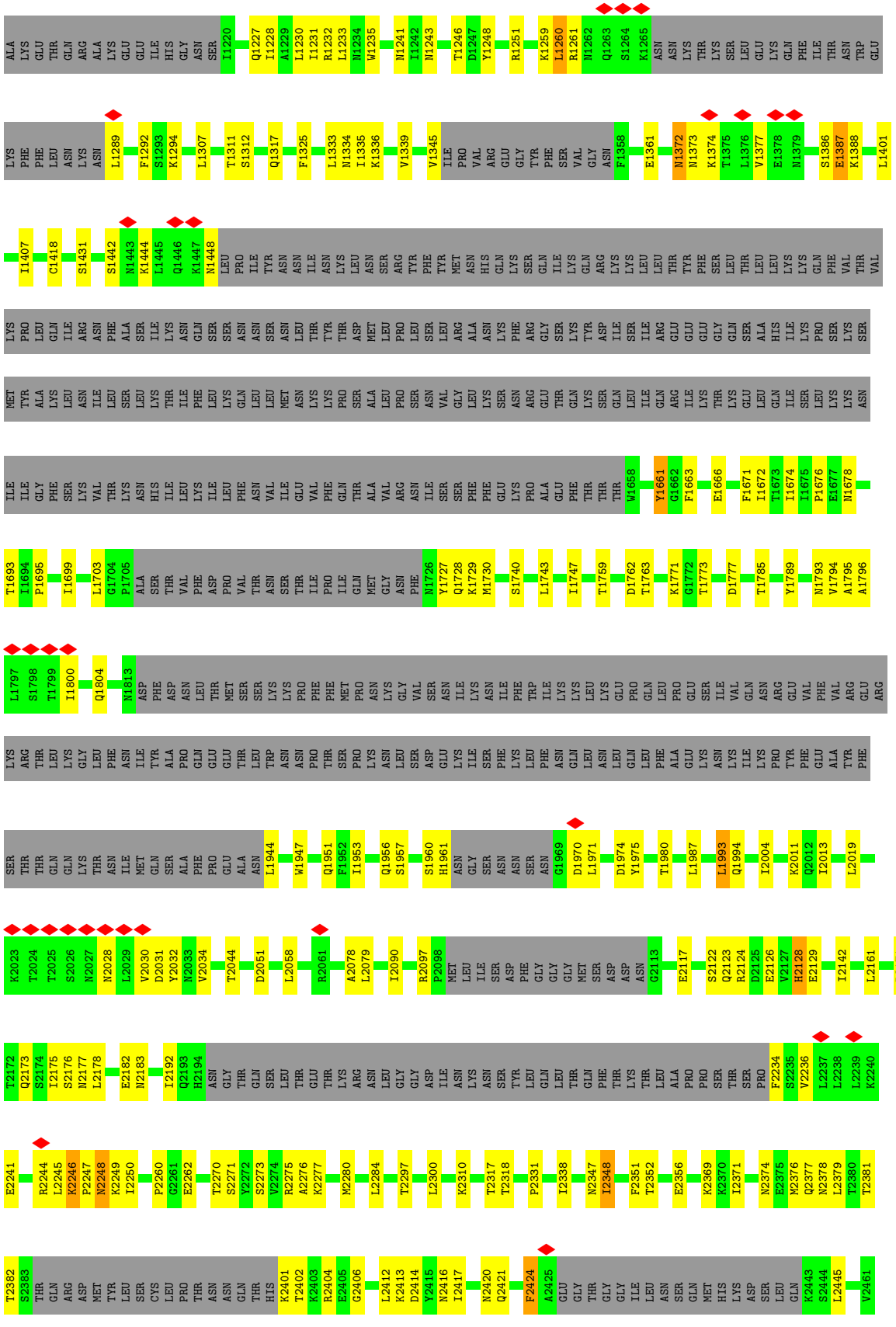
Chain D:

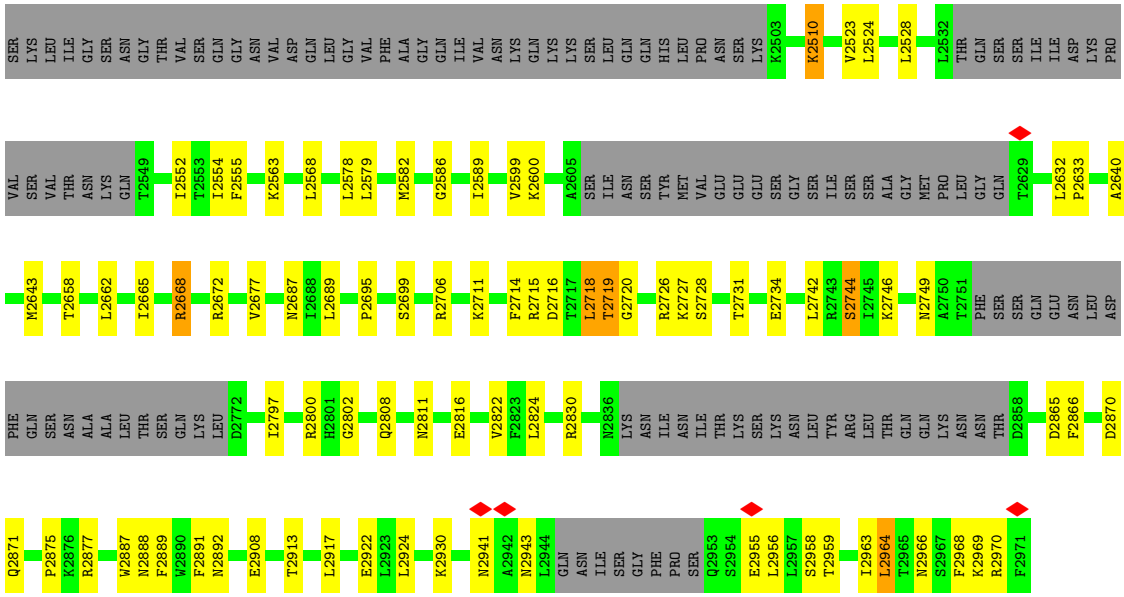


• Molecule 5: Uncharacterized 341.7 kDa protein in psbD-psbC intergenic region

Chain E:

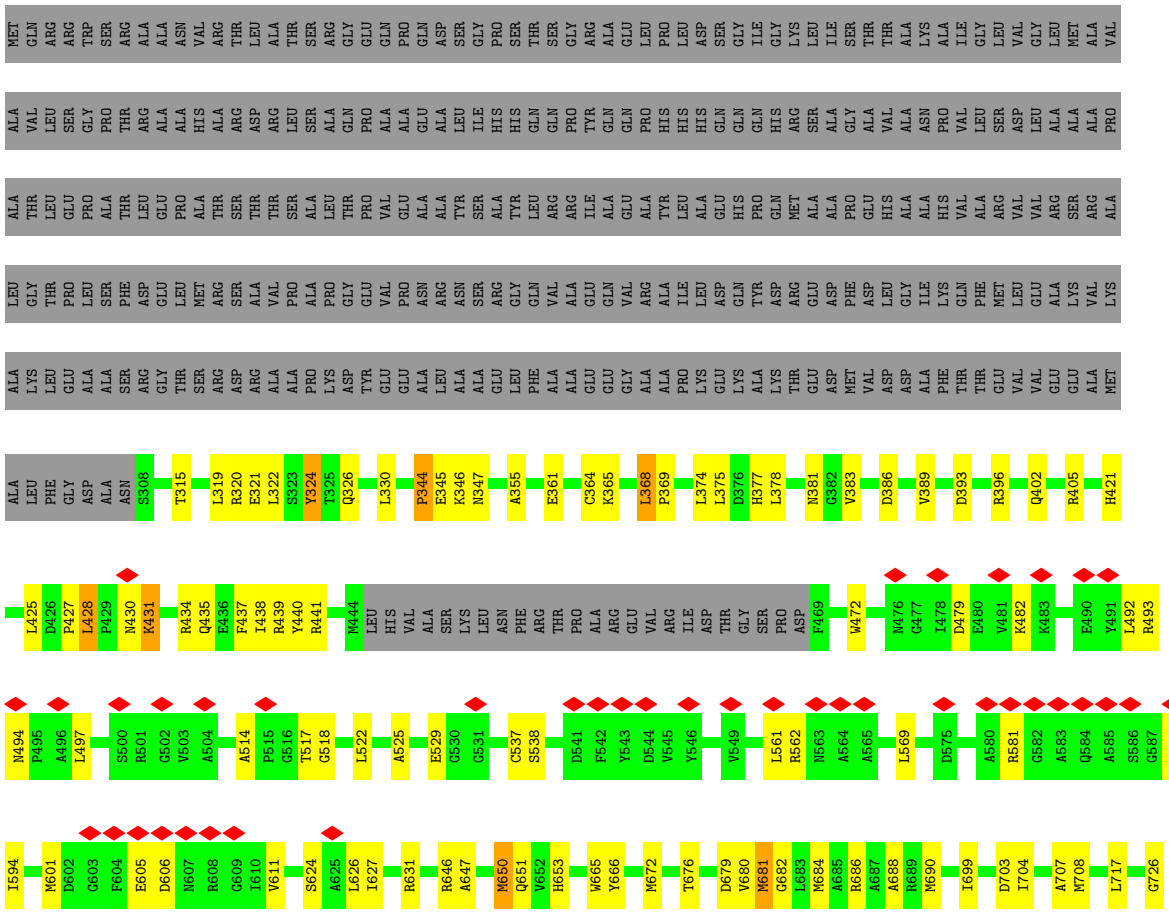

MET THR PHE LEU ASN HIS TYR THR TYR LEU PHE SER ILE PRO GLU LYS GLN ALA ASP LYS VAL SER GLY ILE LEU ARG LEU ALA GLN ALA ARG PRO ILE GLU THR LEU GLN ASN GLU ARG ILE ASN LYS GLN LEU ASN ALA PHE LEU LYS THR TYR LYS PHE GLU LYS LEU ILE THR ASN
TYR LYS LYS MET GLN SER PHE ILE PRO ASN SER ASN LEU ASN GLY ASN LYS THR ASN SER SER THR ASN LYS LEU TYR ALA THR SER LEU ASN VAL PHE PRO GLU THR ASN PRO PRO LEU MET VAL ARG LYS ALA VAL SER ASP GLU ALA ASP LYS PHE SER LYS PHE THR TYR SER LYS VAL
GLN VAL VAL THR ASN ASN ASN LEU ASN ASN GLY MET ASN SER SER LYS GLU PHE ILE LYS ALA ASN ASN ASN SER LEU LEU ASN LYS PRO SER LEU ARG ALA ALA GLU SER LEU VAL LEU GLN ASN HIS LEU THR TYR ASN LYS PHE LYS GLU ASN LEU TYR PHE LYS THR ASN ASN ILE GLN PRO THR TYR LYS SER LYS SER
THR SER LEU PHE PHE LEU ASN ILE LEU SER ASN SER LYS PRO ARG THR CYS SER ASP PHE LEU SER SER PRO LYS ILE ARG LYS THR TRP PHE ARG ASN THR ALA TRP SER LEU GLN THR GLN GLN HIS ARG SER SER ASN GLY ILE ASN LEU SER LEU GLN LEU PRO TYR ALA LEU GLY
PRO SER VAL PRO ALA GLY ALA SER GLY GLN ASN MET TYR GLU LEU PRO VAL ALA GLN SER SER SER ARG PHE G265 T266 Y267 Q271 K272 L273 L274 S275 K276 Y277 L278 ASP VAL TRP ASN ALA SER ALA ASP ASN GLY SER VAL LEU SER ASN SER GLU ASN ILE LYS LEU ASN PHE SER
MET VAL SER LEU LEU ASP SER LYS MET ALA ILE GLN THR PRO N317 Q325 L326 N327 P338 T348 T351 LEU THR GLY GLN SER VAL SER VAL GLN LYS PHE ASN SER PHE ILE ASN LYS LYS THR ASP MET MET VAL LEU SER ASN THR GLU MET PRO SER LYS SER PHE GLY
THR PRO THR LEU PHE GLY THR SER VAL GLU ILE TYR LEU PRO ASN SER TYR MET PRO LYS GLY GLU GLY GLU SER GLY ILE ASN ARG VAL ASN SER SER ILE ASN ALA VAL LYS LYS ASN THR VAL THR ALA ASN LEU VAL LEU ASP SER GLU SER GLN GLU MET VAL ALA THR SER PHE GLN
N447 D448 I452 C455 T467 T471 L474 PHE LEU PHE SER ALA ILE LYS SER ASN ALA THR LYS HIS LYS ARG THR GLN SER PHE PHE SER VAL GLU GLU ASN THR THR THR LEU GLY ASN ASN SER ASN PHE VAL LYS GLY HIS PHE LYS SER SER SER ILE ASN ALA PHE SER SER
TYR LEU PRO SER THR ASN VAL HIS SER MET ILE PRO LEU THR SER L538 L541 I544 S545 P546 L547 I553 L557 K558 K567 L568 L569 K572 K575 SER PRO LYS GLN MET TYR THR LYS THR GLN ASN PHE THR GLY LEU ARG ASP LEU ARG ALA LEU ASN SER PHE
SER PHE GLY GLN VAL ASN PHE ARG THR ASN HIS PHE LEU HIS SER N615 S616 R617 P618 L619 Y622 N630 Y635 N644 LYS THR LEU ASP LEU ASN THR LYS ASN LYS LEU VAL TYR GLN VAL HIS LYS SER HIS LEU PHE ASN GLN LYS CYS SER GLN ILE VAL TYR LYS GLN
SER LEU TYR ASN ARG ASP LEU CYS THR ILE ARG GLY THR GLY THR LYS VAL VAL ASP TYR PHE SER HIS GLY ASP LYS LEU SER ASN LYS ASN GLY ILE ASP TYR PHE VAL TYR SER ASN LEU LEU LEU PHE ASP ASN LYS THR ASN THR ILE ILE ASN LYS ASP GLY LYS GLN ASN
I737 L744 T745 F751 I755 K756 LYS TYR THR SER ILE ASN SER LEU VAL ALA ASN GLU GLN THR ARG ASN ASN LEU ASN LEU GLY LEU ILE HIS PHE ASN GLY HIS L785 N790 T795 GLY ARG PRO VAL LYS PHE ILE TYR TYR LYS PHE ASP K808 R809 N829 ASN PHE
LEU LYS PRO LYS PRO LEU SER HIS GLN LYS ASN LYS PRO VAL GLU ASP PHE ASN GLN TYR ALA THR ASN ASN SER SER PRO PRO LYS THR ASN VAL PHE GLU LYS SER PHE VAL GLU ASP SER SER LEU ARG LYS PRO LEU T879 F901 K902 K903 K904 T905 L906 K910 W911 HIS SER
ASP THR GLN GLY ILE PHE ARG LYS HIS THR ASN SER SER PHE GLY SER ALA ASN PHE SER ASN GLY P936 S940 R944 K952 A953 K954 L958 E959 T960 R961 R962 R966 T967 R968 F969 P970 P971 R972 R979 E987 K990 S995 THR ILE THR LYS GLN GLY PHE
SER LEU PRO SER LYS ASP VAL VAL THR THR LYS LEU ASP TRP LEU LYS GLU ASP MET ARG PRO SER SER LEU GLY ALA TYR GLN TYR LYS SER LEU LEU THR GLN LYS ALA GLY ASN LYS PHE GLN ARG GLN SER PHE THR GLU VAL VAL SER THR MET GLU TYR ILE ASN GLY ILE HIS
LYS ALA LEU ASN SER ILE PHE ASN LYS ILE VAL ARG LYS SER LEU LEU SER SER GLN ASN PRO LEU LYS LEU ARG LEU VAL ALA ASN TYR SER LYS MET GLN PHE MET HIS ARG VAL LYS LEU PRO PHE TYR ARG THR LEU LYS HIS SER GLU GLY THR LYS ASN LEU ALA ASN
LYS LYS GLN ASN LEU ARG ILE LYS ILE LYS ALA ASN TYR ASN ASN ASP PRO GLN GLN ASN ASP LYS ASP LYS D1158 Q1179 W1182 P1186 N1187 L1188 T1189 THR LYS GLN SER ASN LEU GLU PHE LEU THR SER THR TYR PRO THR
WORLDWIDE PDB PROTEIN DATA BANK

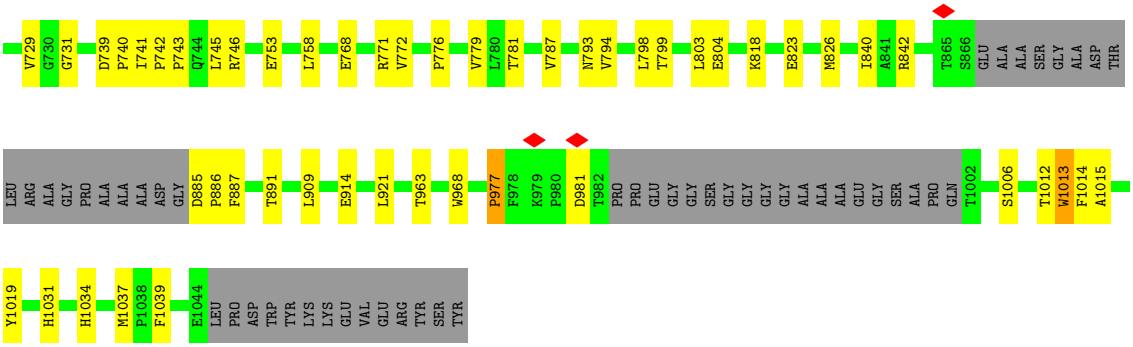




• Molecule 6: AAA+ ATPase domain-containing protein

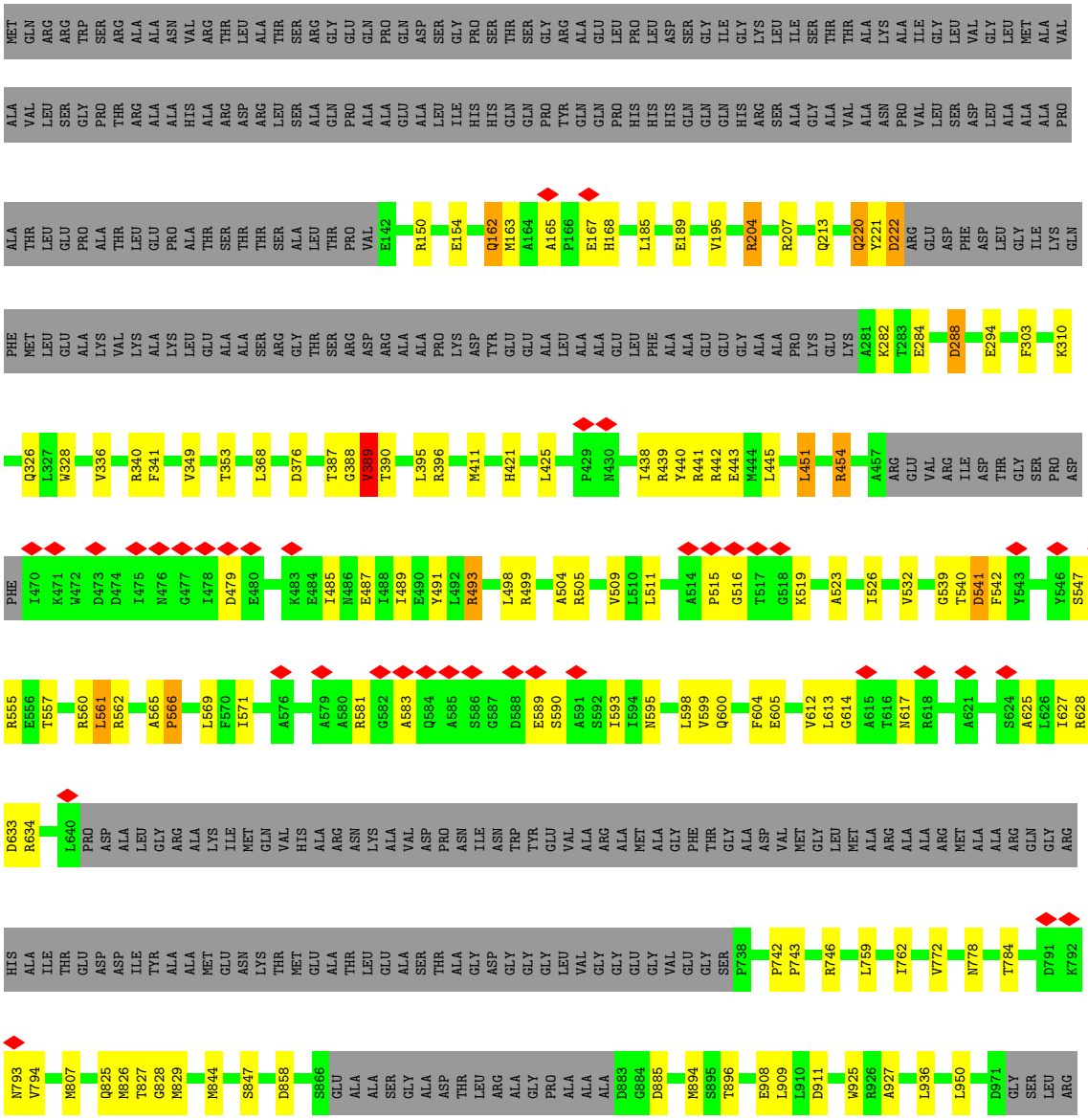
Chain F:

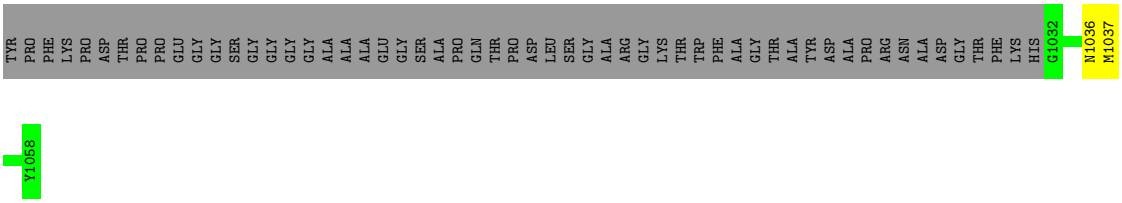




• Molecule 6: AAA+ ATPase domain-containing protein

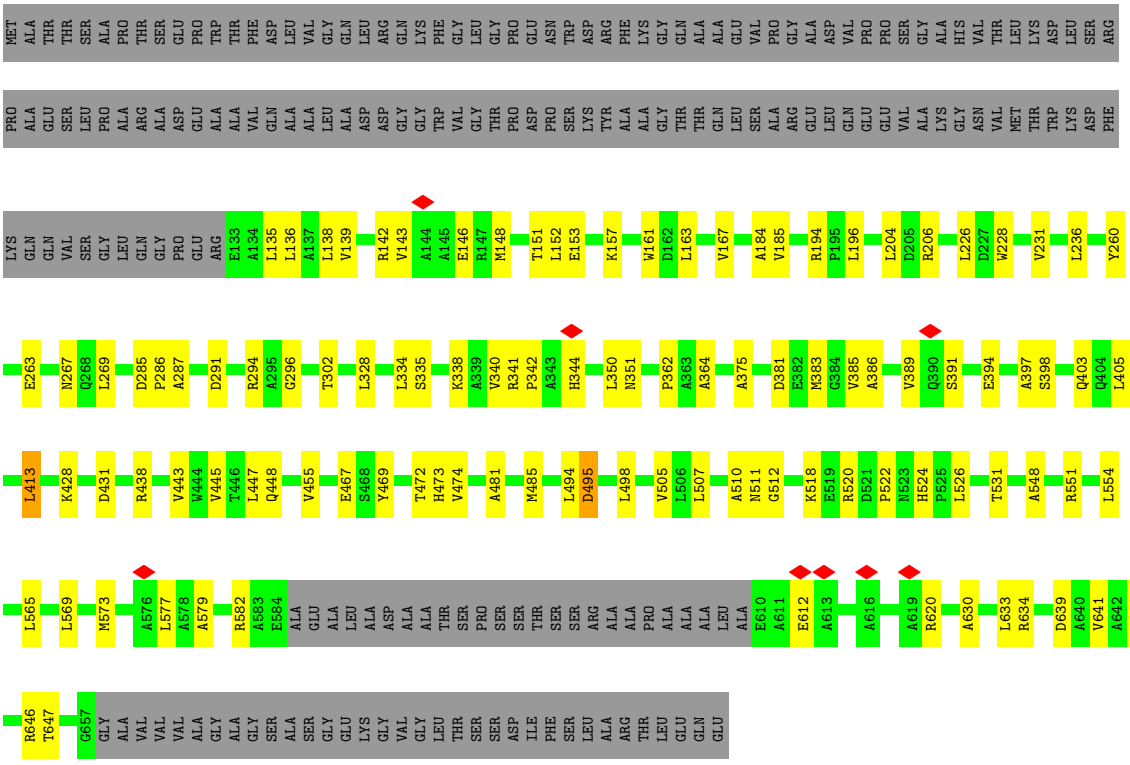
Chain G:





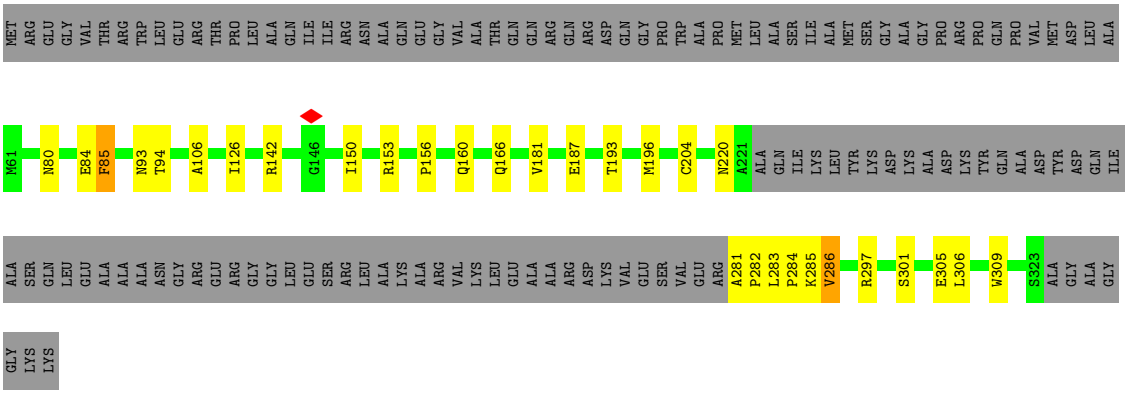
• Molecule 7: Flagellar associated protein

Chain H:



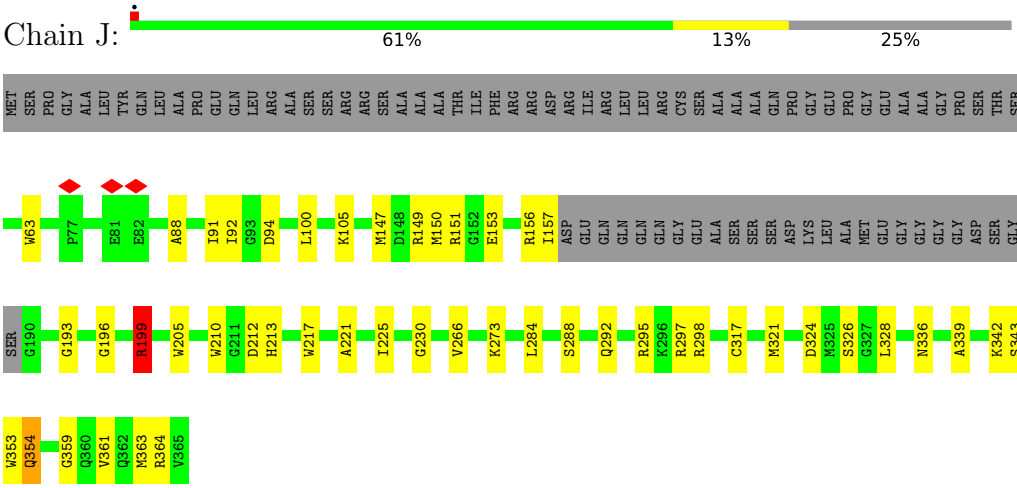
• Molecule 8: Tic22

Chain I:



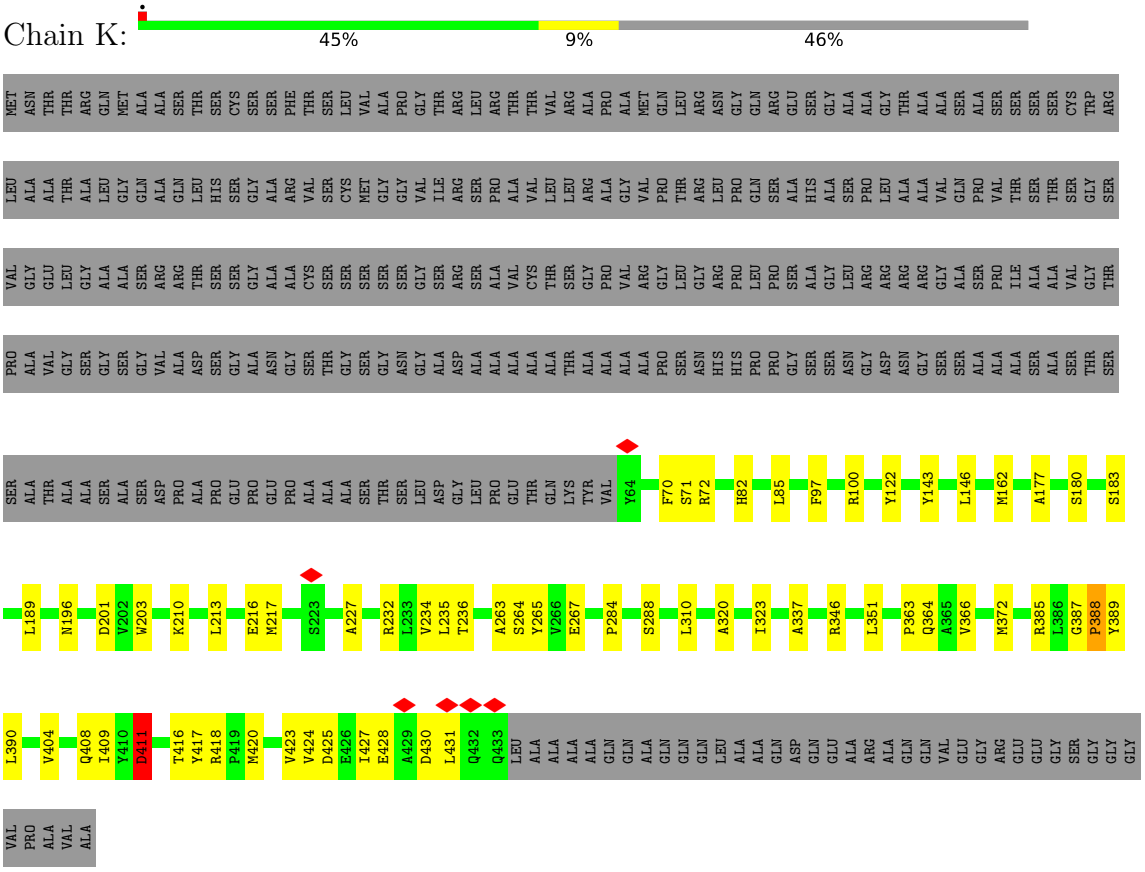
• Molecule 9: FaxL

Chain J:



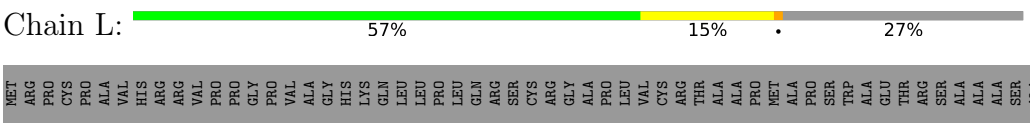
• Molecule 10: Fatty acid desaturase domain-containing protein

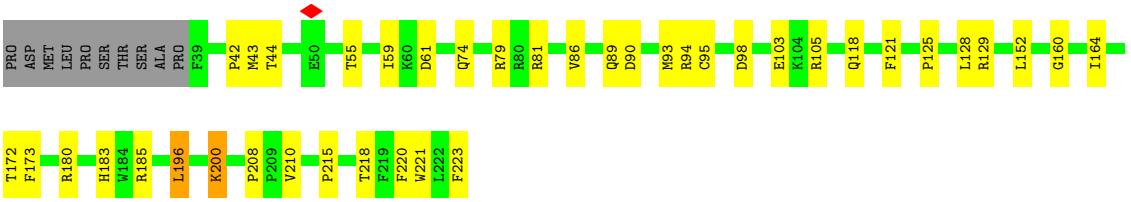
Chain K:



• Molecule 11: Moc25

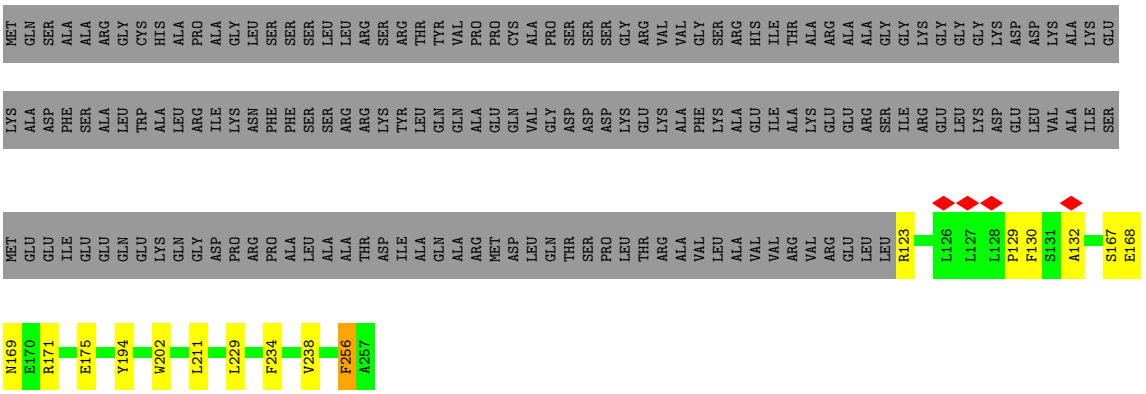
Chain L:





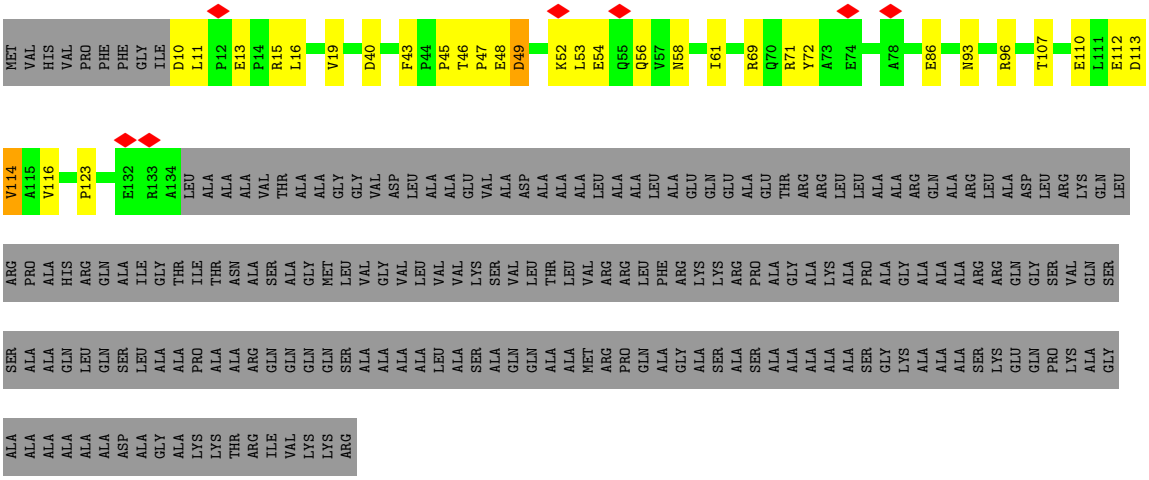
• Molecule 12: Moc29

Chain M:



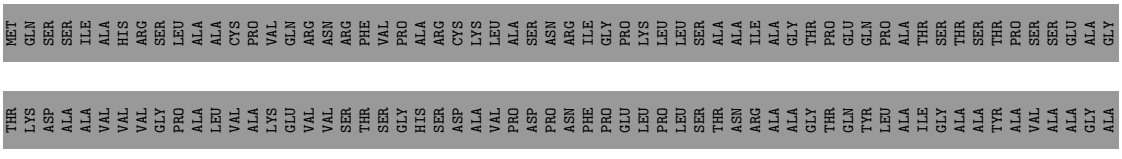
• Molecule 13: Moc34

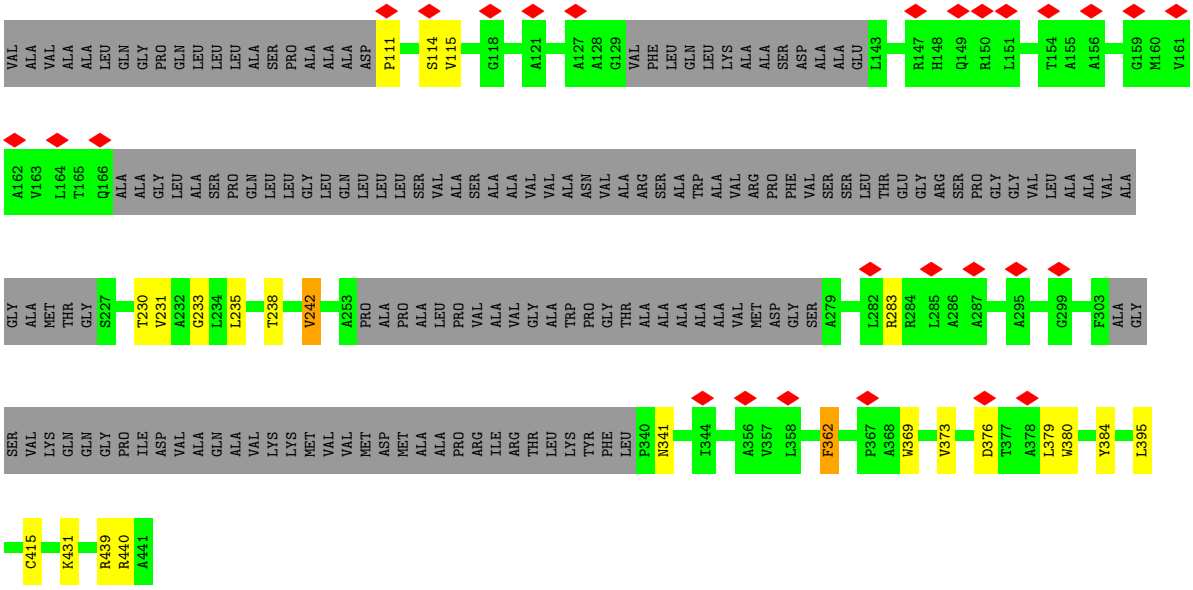
Chain N:



• Molecule 14: Moc45

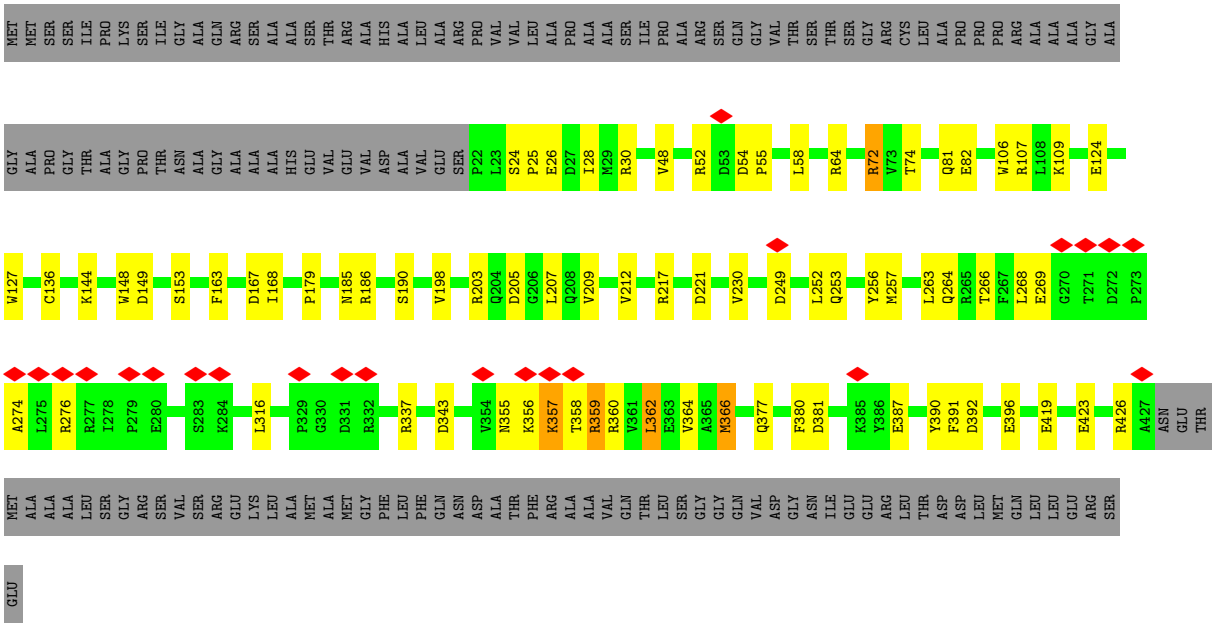
Chain O:





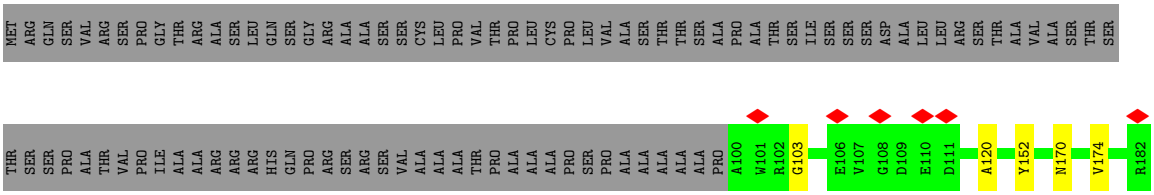
• Molecule 15: PcyA1

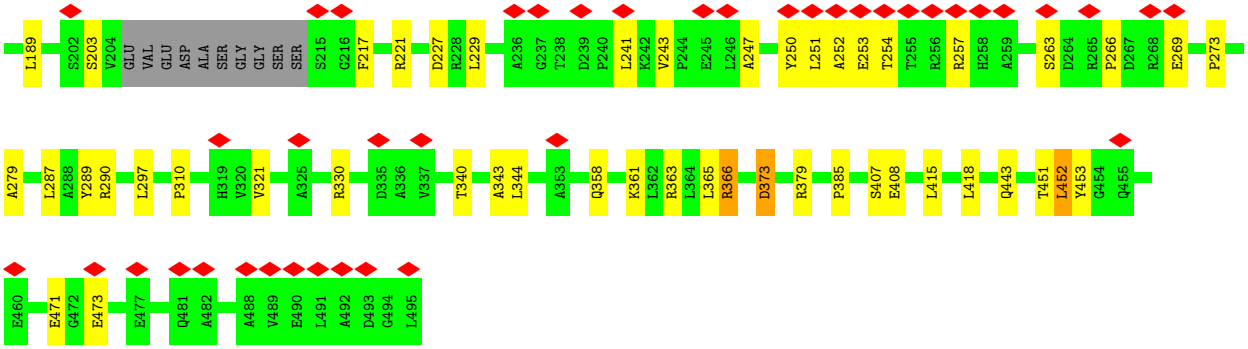
Chain P:



• Molecule 16: ADP-ribosylglycohydrolase

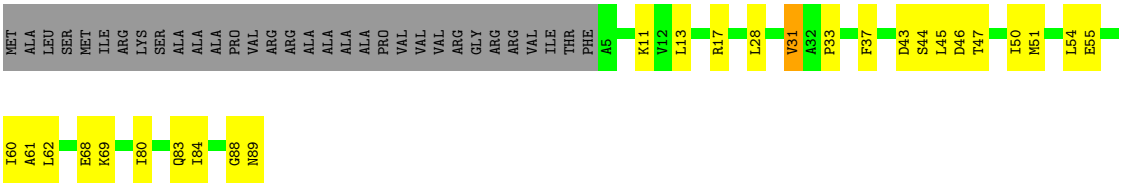
Chain Q:





• Molecule 17: Acyl carrier protein

Chain R:

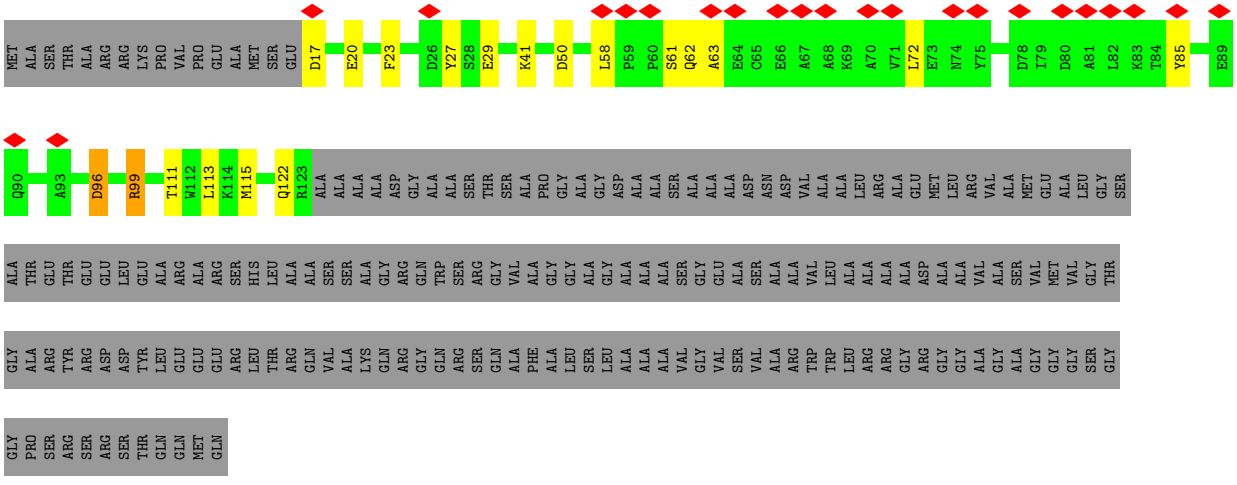


• Molecule 18: Moc13

Chain S:

• Molecule 19: Moc31

Chain T:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	127613	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	50	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	Not provided	
Image detector	GATAN K2 QUANTUM (4k x 4k)	Depositor
Maximum map value	0.099	Depositor
Minimum map value	-0.000	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.002	Depositor
Recommended contour level	0.00943	Depositor
Map size (Å)	436.8, 436.8, 436.8	wwPDB
Map dimensions	420, 420, 420	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.04, 1.04, 1.04	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: SEP, SQD, ZN, DGA, LMG, DGD, ACD

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	0.31	0/5693	0.62	5/7745 (0.1%)
2	B	0.30	0/4671	0.57	0/6328
3	C	0.33	0/3172	0.59	2/4315 (0.0%)
4	D	0.36	3/7715 (0.0%)	0.62	13/10469 (0.1%)
5	E	0.34	1/12285 (0.0%)	0.58	9/16600 (0.1%)
6	F	0.35	0/5322	0.65	4/7210 (0.1%)
6	G	0.33	0/5367	0.61	5/7277 (0.1%)
7	H	0.32	1/3747 (0.0%)	0.65	3/5108 (0.1%)
8	I	0.35	0/1652	0.61	0/2238
9	J	0.33	0/2159	0.61	2/2934 (0.1%)
10	K	0.33	0/2954	0.58	2/4054 (0.0%)
11	L	0.36	0/1600	0.73	4/2186 (0.2%)
12	M	0.42	1/1175 (0.1%)	0.57	0/1613
13	N	0.46	0/1024	0.72	1/1391 (0.1%)
14	O	0.31	0/1561	0.55	1/2135 (0.0%)
15	P	0.31	0/3323	0.59	4/4513 (0.1%)
16	Q	0.29	0/2946	0.56	0/4014
17	R	0.36	0/624	0.62	1/839 (0.1%)
18	S	0.51	1/933 (0.1%)	0.62	0/1266
19	T	0.35	0/856	0.61	0/1159
All	All	0.34	7/68779 (0.0%)	0.61	56/93394 (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
2	B	0	1
4	D	0	2
5	E	0	1

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Mol	Chain	#Chirality outliers	#Planarity outliers
6	F	0	2
6	G	0	1
13	N	0	1
All	All	0	8

The worst 5 of 7 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	1096	PRO	CG-CD	-11.26	1.13	1.50
18	S	106	VAL	CB-CG1	-9.18	1.33	1.52
4	D	1096	PRO	N-CD	6.60	1.57	1.47
5	E	1387	GLU	CG-CD	5.91	1.60	1.51
12	M	256	PHE	CD1-CE1	-5.70	1.27	1.39

The worst 5 of 56 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	D	1096	PRO	N-CD-CG	-13.31	83.23	103.20
6	F	428	LEU	CB-CG-CD1	-13.01	88.89	111.00
11	L	196	LEU	CB-CG-CD1	-12.67	89.46	111.00
5	E	1186	PRO	CA-N-CD	-11.99	94.72	111.50
1	A	262	PRO	CA-N-CD	-10.91	96.22	111.50

There are no chirality outliers.

5 of 8 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	B	534	ALA	Peptide
4	D	1095	SER	Peptide
4	D	587	LYS	Peptide
5	E	970	PHE	Peptide
6	F	368	LEU	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	5557	0	5450	84	0
2	B	4588	0	4601	70	0
3	C	3085	0	2929	48	0
4	D	7551	0	7556	125	0
5	E	12035	0	12354	246	0
6	F	5216	0	5183	104	0
6	G	5260	0	5225	95	0
7	H	3670	0	3637	70	0
8	I	1619	0	1621	18	0
9	J	2101	0	2056	46	0
10	K	2853	0	2798	40	0
11	L	1541	0	1534	29	0
12	M	1127	0	1096	18	0
13	N	1005	0	987	23	0
14	O	1517	0	1516	17	0
15	P	3245	0	3153	45	0
16	Q	2880	0	2825	32	0
17	R	633	0	636	18	0
18	S	909	0	904	26	0
19	T	840	0	810	11	0
20	C	2	0	0	0	0
21	H	36	0	57	3	0
22	J	47	0	52	2	0
22	L	66	0	96	0	0
23	J	41	0	52	6	0
23	L	47	0	64	2	0
24	K	21	0	31	1	0
25	L	36	0	36	2	0
All	All	67528	0	67259	959	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 7.

The worst 5 of 959 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)
8:I:281:ALA:HB3	8:I:282:PRO:HD3	1.46	0.93
5:E:348:THR:HG23	5:E:1374:LYS:HB2	1.53	0.89
5:E:902:LYS:HD3	6:G:288:ASP:HB3	1.54	0.89
9:J:147:MET:HA	9:J:150:MET:HE2	1.56	0.88
5:E:615:ASN:N	5:E:615:ASN:HD22	1.76	0.83

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	711/982 (72%)	635 (89%)	66 (9%)	10 (1%)	9 40
2	B	593/1024 (58%)	536 (90%)	52 (9%)	5 (1%)	16 51
3	C	385/462 (83%)	348 (90%)	35 (9%)	2 (0%)	25 60
4	D	965/1178 (82%)	899 (93%)	63 (6%)	3 (0%)	37 69
5	E	1402/2971 (47%)	1273 (91%)	114 (8%)	15 (1%)	12 44
6	F	668/1058 (63%)	598 (90%)	64 (10%)	6 (1%)	14 49
6	G	662/1058 (63%)	607 (92%)	50 (8%)	5 (1%)	16 51
7	H	496/691 (72%)	431 (87%)	57 (12%)	8 (2%)	8 37
8	I	200/330 (61%)	174 (87%)	24 (12%)	2 (1%)	13 47
9	J	270/365 (74%)	249 (92%)	21 (8%)	0	100 100
10	K	368/682 (54%)	346 (94%)	19 (5%)	3 (1%)	16 51
11	L	183/255 (72%)	164 (90%)	19 (10%)	0	100 100
12	M	133/303 (44%)	123 (92%)	10 (8%)	0	100 100
13	N	123/324 (38%)	107 (87%)	15 (12%)	1 (1%)	16 51
14	O	187/471 (40%)	181 (97%)	6 (3%)	0	100 100
15	P	404/555 (73%)	379 (94%)	21 (5%)	4 (1%)	13 47
16	Q	382/495 (77%)	365 (96%)	14 (4%)	3 (1%)	16 51
17	R	82/117 (70%)	75 (92%)	7 (8%)	0	100 100
18	S	112/137 (82%)	107 (96%)	5 (4%)	0	100 100
19	T	105/299 (35%)	96 (91%)	9 (9%)	0	100 100
All	All	8431/13757 (61%)	7693 (91%)	671 (8%)	67 (1%)	19 51

5 of 67 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	127	ALA
1	A	288	THR
1	A	828	VAL
2	B	185	VAL
3	C	179	VAL

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	561/774 (72%)	551 (98%)	10 (2%)	54	77
2	B	472/773 (61%)	465 (98%)	7 (2%)	60	81
3	C	309/347 (89%)	298 (96%)	11 (4%)	30	62
4	D	776/934 (83%)	758 (98%)	18 (2%)	45	72
5	E	1367/2762 (50%)	1333 (98%)	34 (2%)	42	71
6	F	536/819 (65%)	527 (98%)	9 (2%)	56	78
6	G	548/819 (67%)	532 (97%)	16 (3%)	37	67
7	H	347/485 (72%)	343 (99%)	4 (1%)	67	85
8	I	174/268 (65%)	170 (98%)	4 (2%)	45	72
9	J	199/261 (76%)	195 (98%)	4 (2%)	50	75
10	K	283/492 (58%)	274 (97%)	9 (3%)	34	65
11	L	160/215 (74%)	155 (97%)	5 (3%)	35	66
12	M	110/243 (45%)	109 (99%)	1 (1%)	75	89
13	N	107/229 (47%)	102 (95%)	5 (5%)	22	55
14	O	149/340 (44%)	143 (96%)	6 (4%)	27	59
15	P	345/451 (76%)	340 (99%)	5 (1%)	62	82
16	Q	277/358 (77%)	274 (99%)	3 (1%)	70	86
17	R	64/87 (74%)	63 (98%)	1 (2%)	58	79
18	S	91/107 (85%)	90 (99%)	1 (1%)	70	86
19	T	83/200 (42%)	78 (94%)	5 (6%)	16	48

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	6958/10964 (64%)	6800 (98%)	158 (2%)	46 72

5 of 158 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
9	J	353	TRP
15	P	72	ARG
10	K	100	ARG
11	L	221	TRP
16	Q	452	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

Mol	Chain	Res	Type
17	R	83	GLN
15	P	355	ASN
5	E	2892	ASN
5	E	2420	ASN
12	M	169	ASN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains (i)

1 non-standard protein/DNA/RNA residue is modelled in this entry.

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	$\#\|Z\| > 2$
17	SEP	R	44	17	8,9,10	1.58	1 (12%)	8,12,14	1.36	2 (25%)

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
17	SEP	R	44	17	-	3/5/8/10	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
17	R	44	SEP	P-O1P	3.38	1.61	1.50

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
17	R	44	SEP	P-OG-CB	-2.28	112.01	118.30
17	R	44	SEP	OG-CB-CA	2.28	110.36	108.14

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
17	R	44	SEP	CB-OG-P-O2P
17	R	44	SEP	CB-OG-P-O3P
17	R	44	SEP	CB-OG-P-O1P

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

Of 9 ligands modelled in this entry, 2 are monoatomic - leaving 7 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	$\#\|Z\| > 2$
22	DGD	L	302	-	67,67,67	1.15	6 (8%)	81,81,81	1.09	8 (9%)
25	SQD	L	303	-	35,36,54	1.75	5 (14%)	44,47,65	2.27	11 (25%)
23	LMG	J	402	-	41,41,55	1.02	1 (2%)	49,49,63	1.12	5 (10%)
23	LMG	L	301	-	47,47,55	0.95	1 (2%)	55,55,63	1.03	4 (7%)
21	DGA	H	701	-	35,35,43	0.69	0	37,37,45	0.89	2 (5%)
24	ACD	K	501	-	20,20,21	2.48	5 (25%)	19,19,21	1.30	1 (5%)
22	DGD	J	401	-	48,48,67	1.20	3 (6%)	62,62,81	1.29	9 (14%)

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
22	DGD	L	302	-	-	38/55/95/95	0/2/2/2
25	SQD	L	303	-	-	13/31/51/69	0/1/1/1
23	LMG	J	402	-	-	19/36/56/70	0/1/1/1
23	LMG	L	301	-	-	20/42/62/70	0/1/1/1
21	DGA	H	701	-	-	21/37/37/45	-
24	ACD	K	501	-	-	10/17/18/19	-
22	DGD	J	401	-	-	13/36/76/95	0/2/2/2

The worst 5 of 21 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
25	L	303	SQD	O9-S	5.30	1.60	1.45
24	K	501	ACD	O1-C1	5.20	1.49	1.19
25	L	303	SQD	O7-S	4.95	1.59	1.45
24	K	501	ACD	C9-C8	4.46	1.57	1.31
24	K	501	ACD	C12-C11	4.44	1.57	1.31

The worst 5 of 40 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
25	L	303	SQD	O9-S-C6	9.56	118.30	106.94

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
25	L	303	SQD	O8-S-C6	4.95	113.63	105.74
25	L	303	SQD	O7-S-C6	4.46	112.24	106.94
22	J	401	DGD	O2G-C1B-C2B	3.65	119.38	111.50
24	K	501	ACD	O1-C1-C2	-3.64	102.99	126.89

There are no chirality outliers.

5 of 134 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
21	H	701	DGA	CB2-CB1-OG2-CG2
22	J	401	DGD	C2B-C1B-O2G-C2G
22	J	401	DGD	O1B-C1B-O2G-C2G
22	L	302	DGD	C2B-C1B-O2G-C2G
22	L	302	DGD	O2G-C2G-C3G-O3G

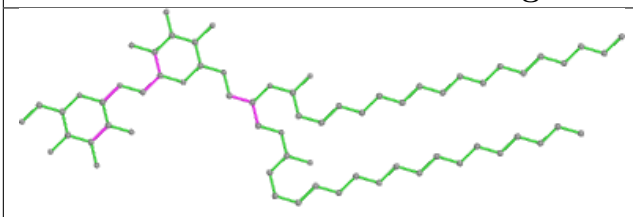
There are no ring outliers.

6 monomers are involved in 15 short contacts:

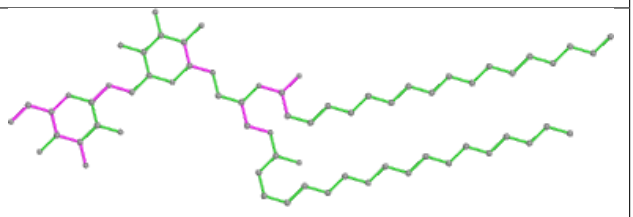
Mol	Chain	Res	Type	Clashes	Symm-Clashes
25	L	303	SQD	2	0
23	J	402	LMG	6	0
23	L	301	LMG	2	0
21	H	701	DGA	3	0
24	K	501	ACD	1	0
22	J	401	DGD	2	0

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.

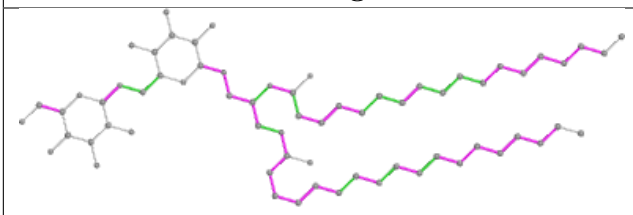
Ligand DGD L 302



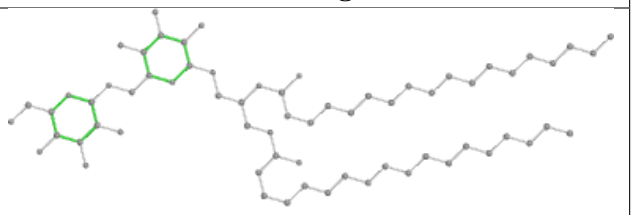
Bond lengths



Bond angles

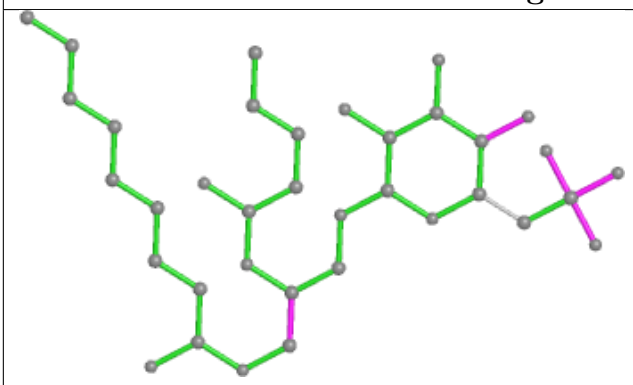


Torsions

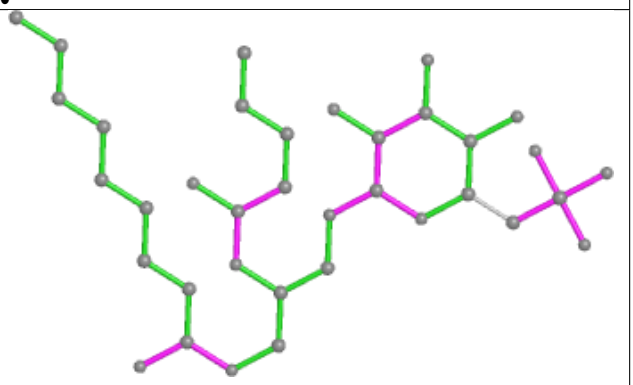


Rings

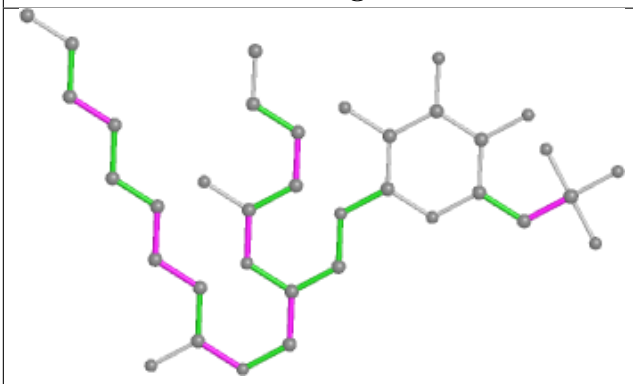
Ligand SQD L 303



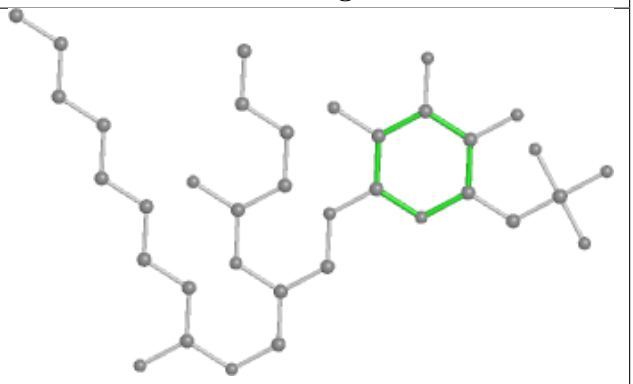
Bond lengths



Bond angles

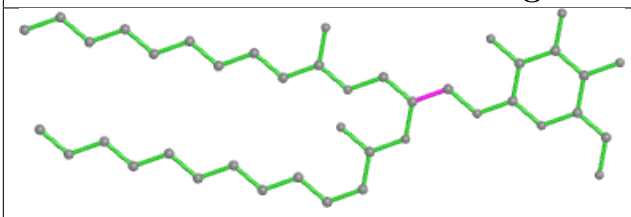


Torsions

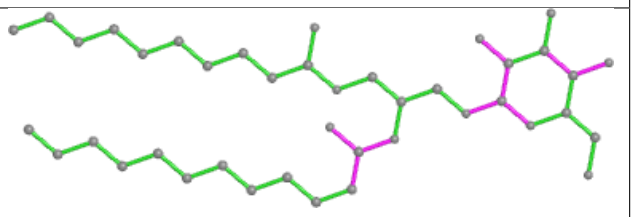


Rings

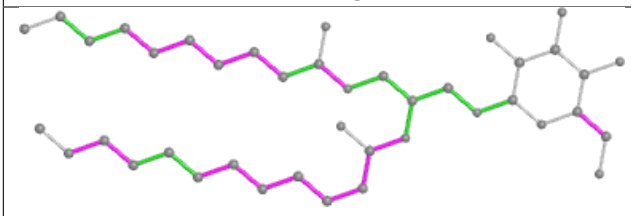
Ligand LMG J 402



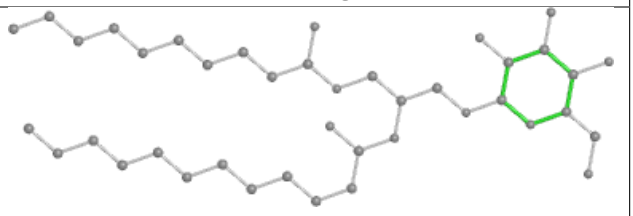
Bond lengths



Bond angles

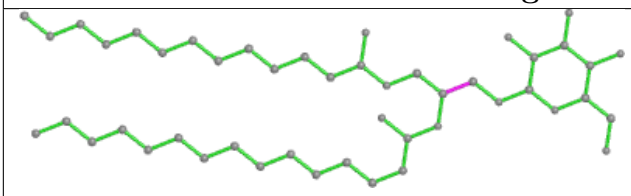


Torsions

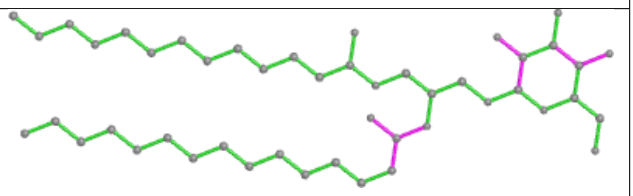


Rings

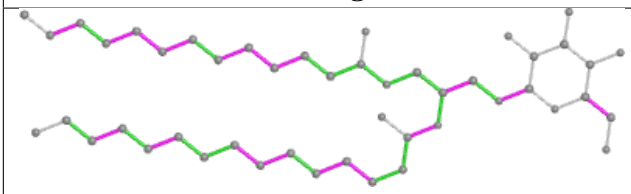
Ligand LMG L 301



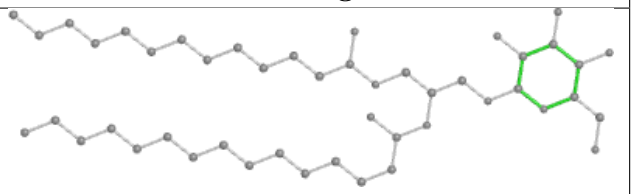
Bond lengths



Bond angles

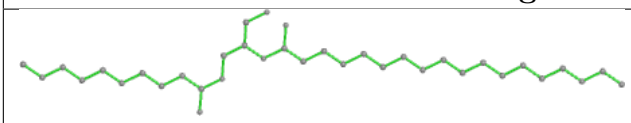


Torsions

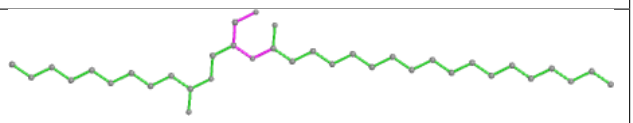


Rings

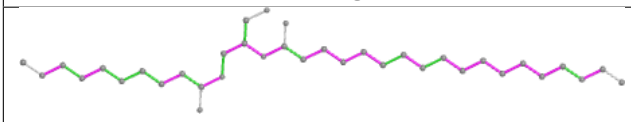
Ligand DGA H 701



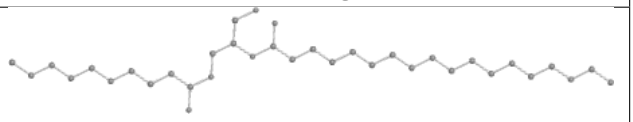
Bond lengths



Bond angles

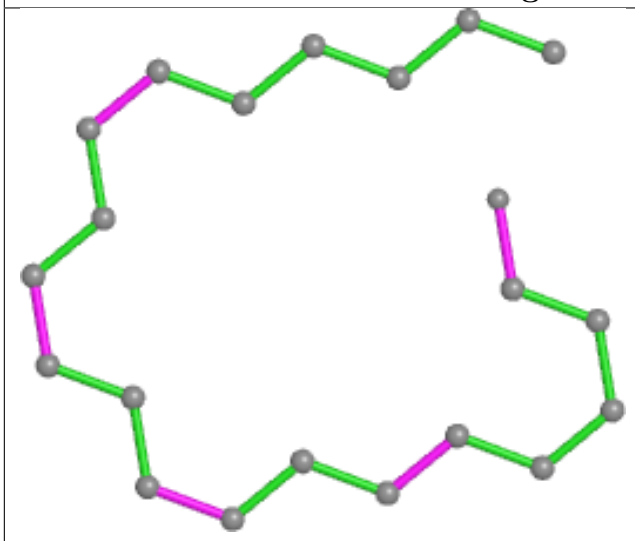


Torsions

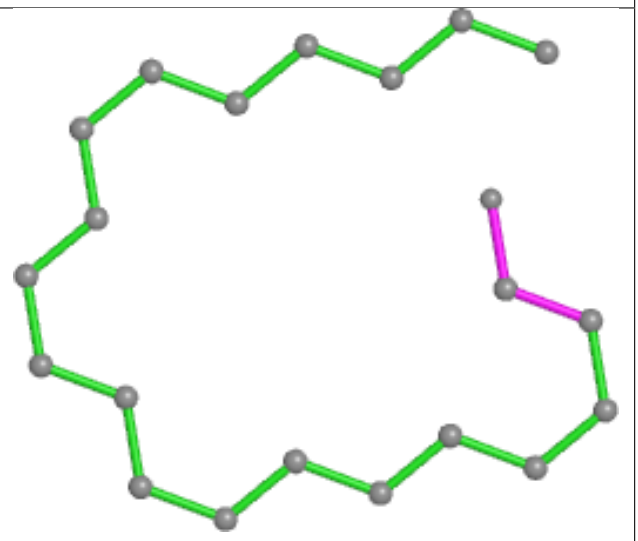


Rings

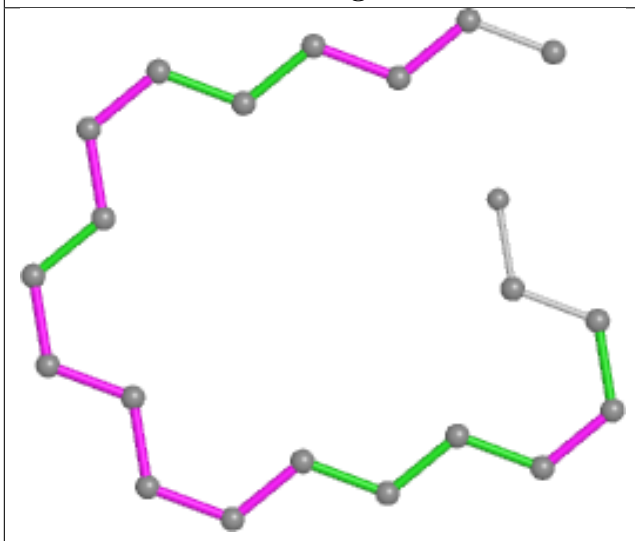
Ligand ACD K 501



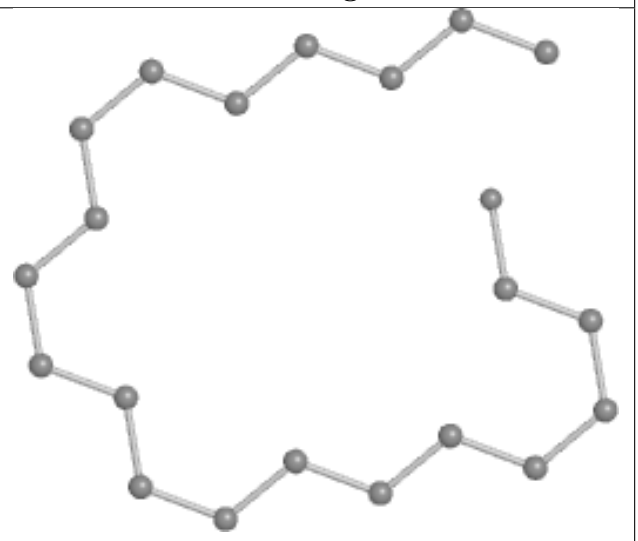
Bond lengths



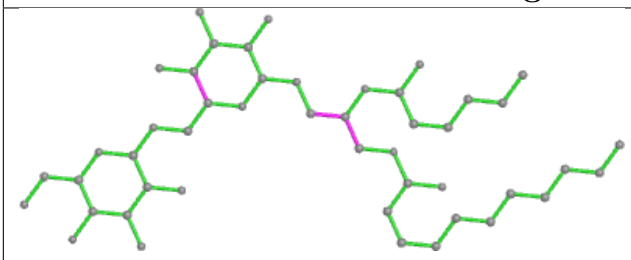
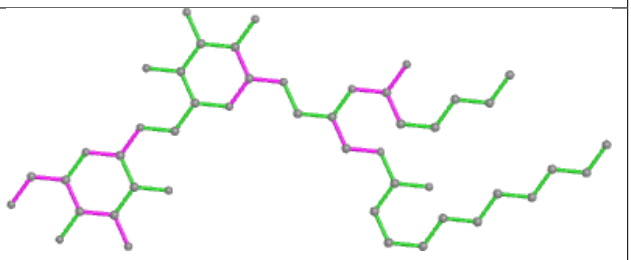
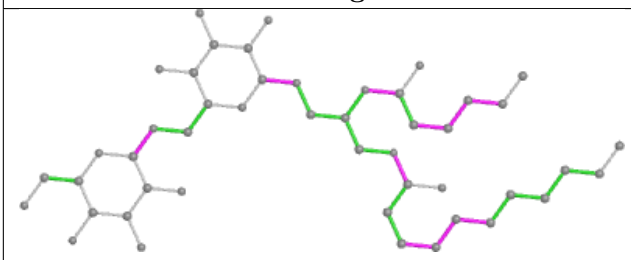
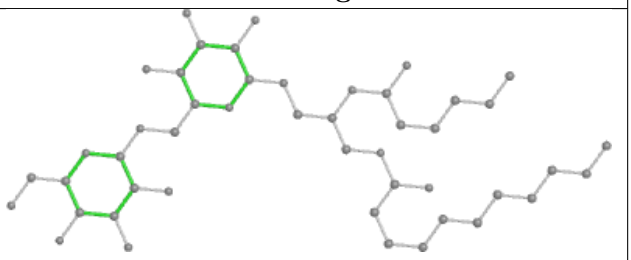
Bond angles



Torsions



Rings

Ligand DGD J 401	
 Bond lengths	 Bond angles
 Torsions	 Rings

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

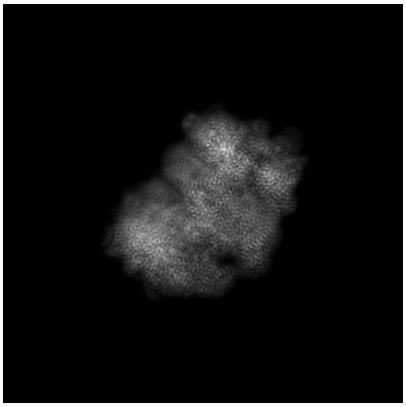
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-38424. These allow visual inspection of the internal detail of the map and identification of artifacts.

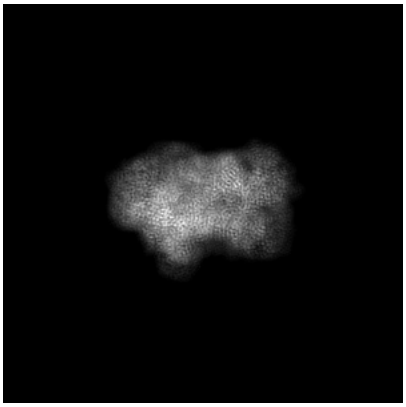
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections

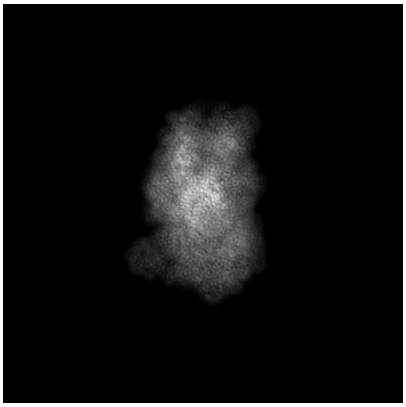
6.1.1 Primary map



X



Y

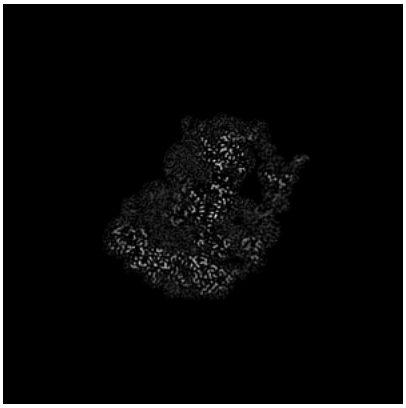


Z

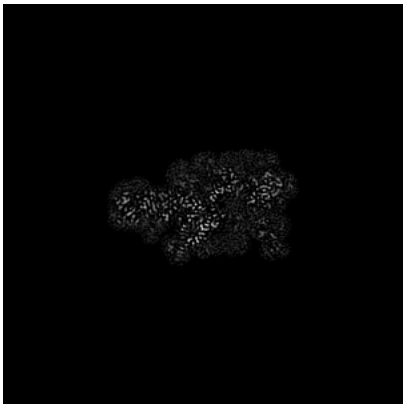
The images above show the map projected in three orthogonal directions.

6.2 Central slices

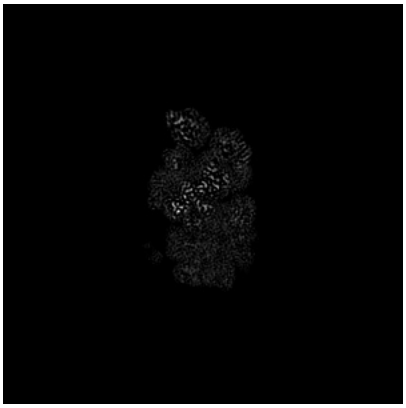
6.2.1 Primary map



X Index: 210



Y Index: 210

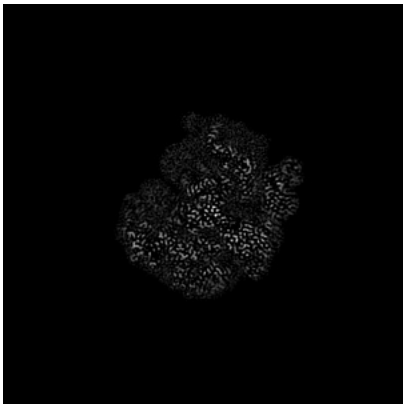


Z Index: 210

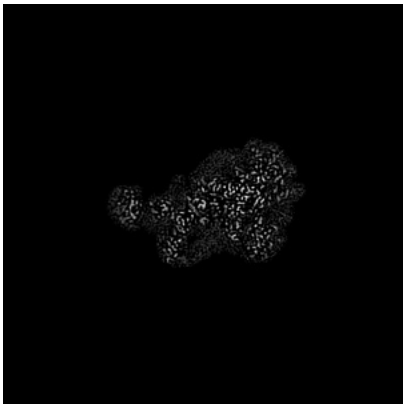
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

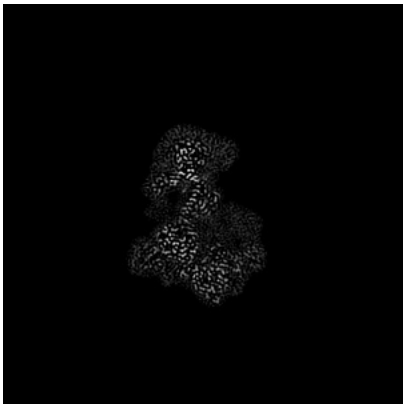
6.3.1 Primary map



X Index: 195



Y Index: 228

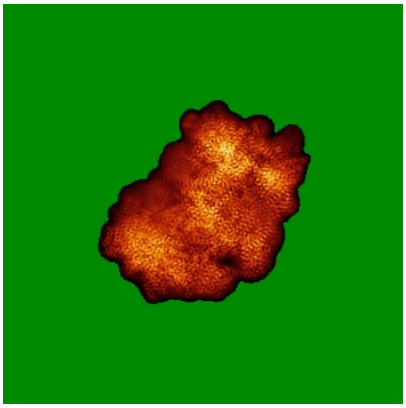


Z Index: 171

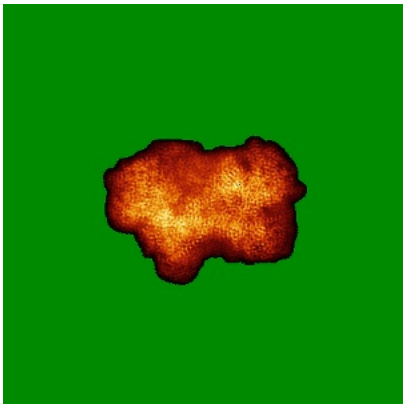
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) (i)

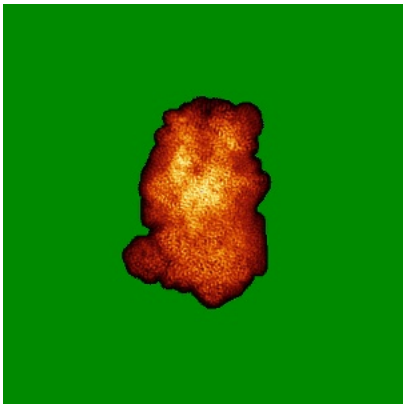
6.4.1 Primary map



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

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.00943. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

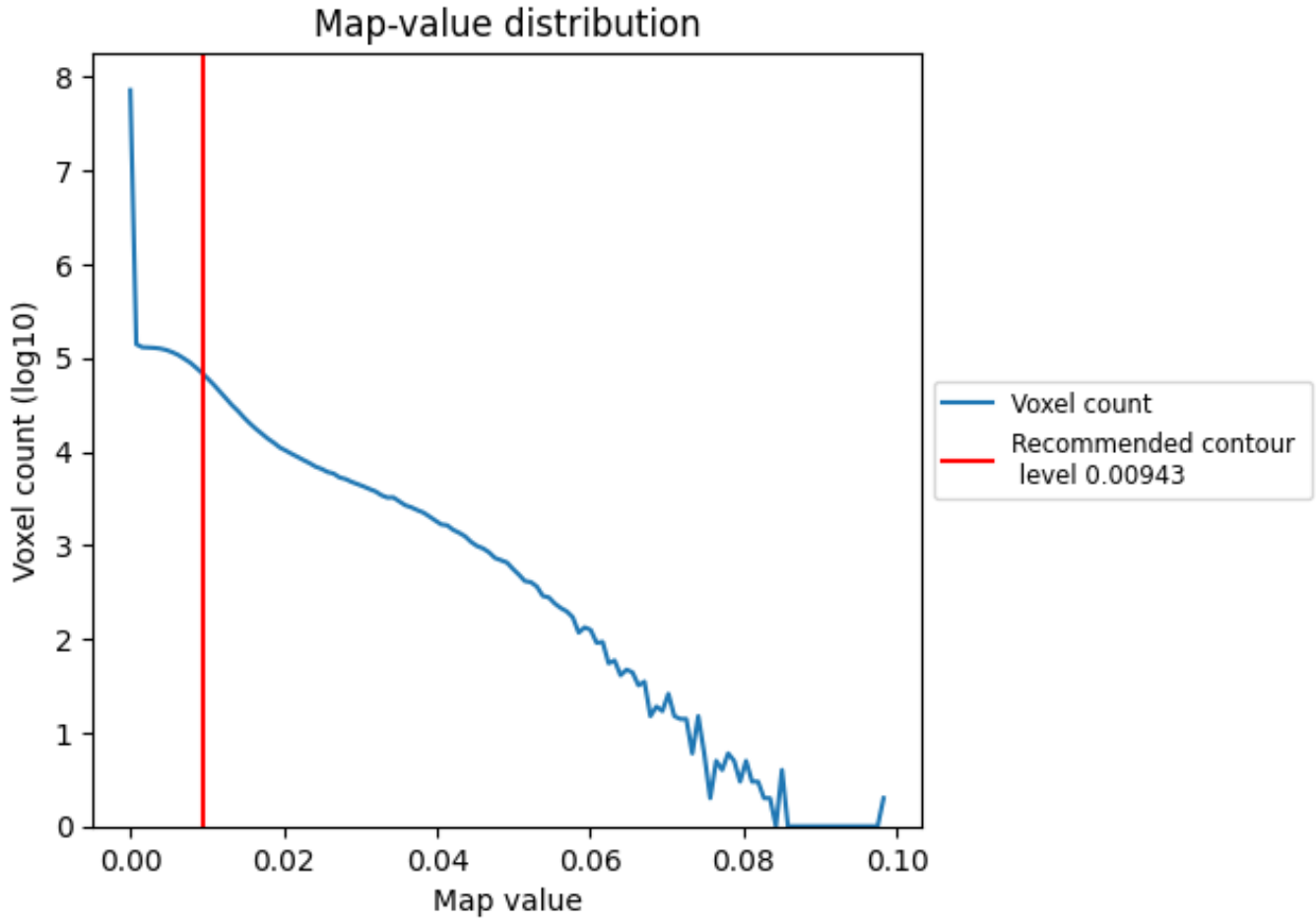
6.6 Mask visualisation (i)

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

7 Map analysis

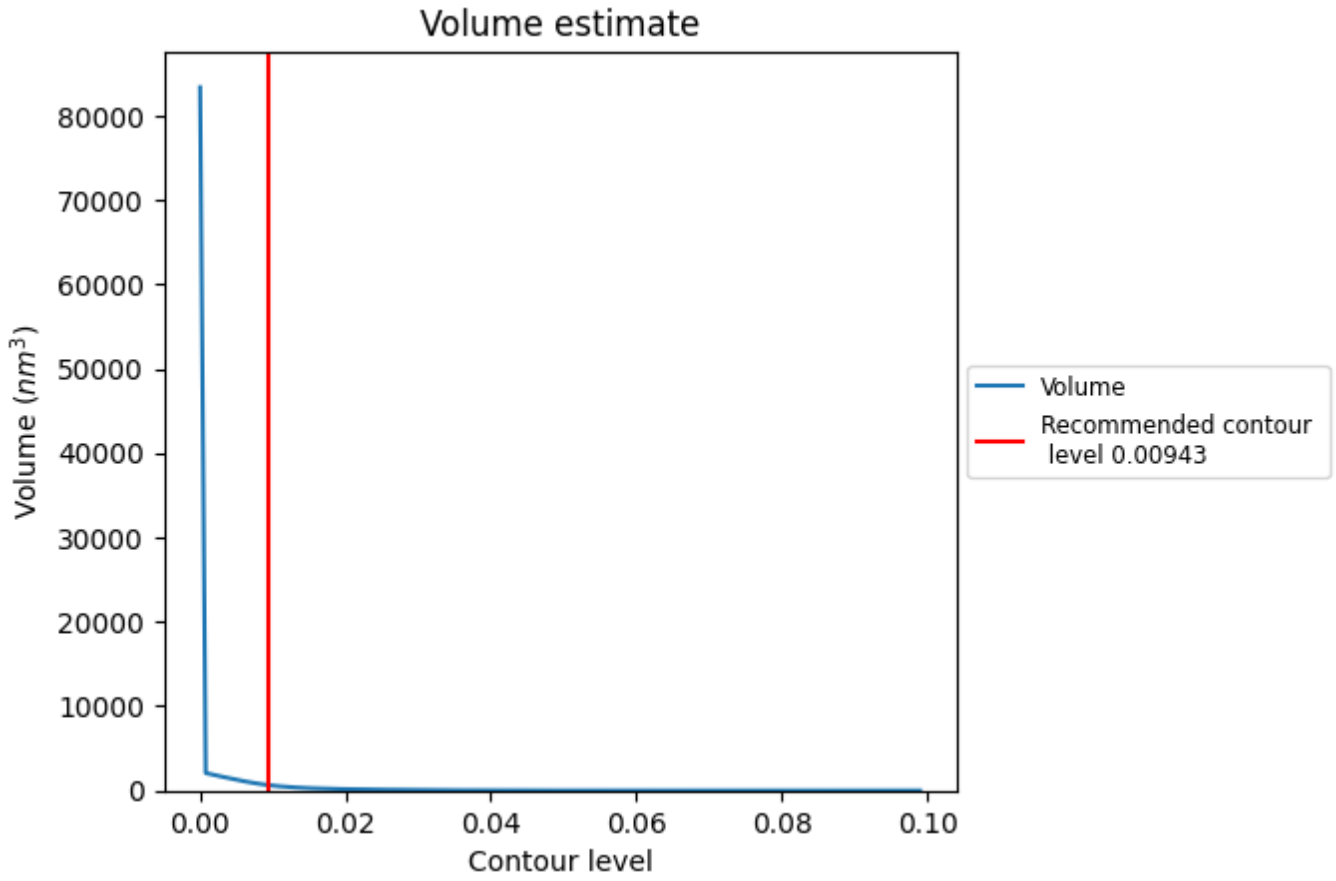
This section contains the results of statistical analysis of the map.

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.

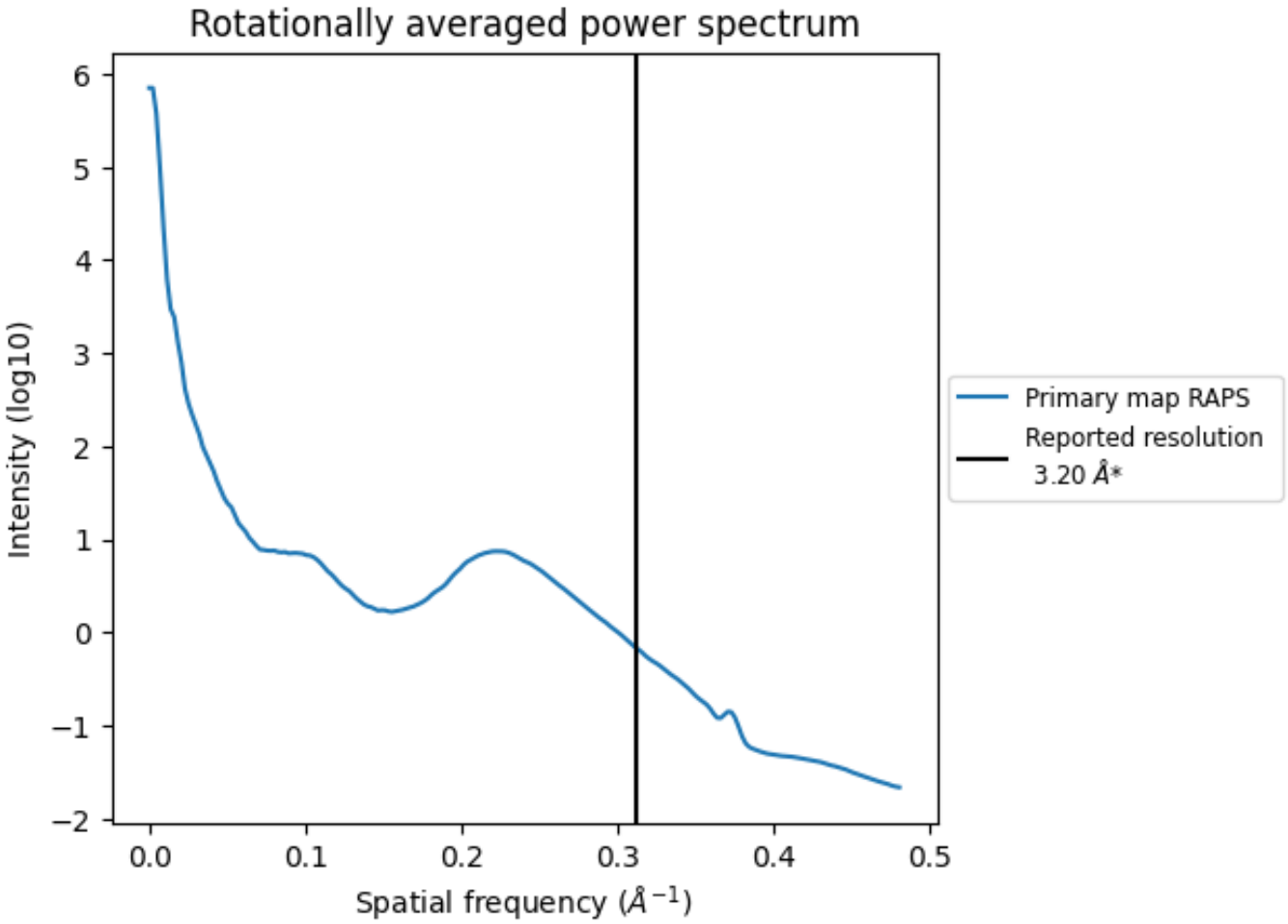
7.2 Volume estimate (i)



The volume at the recommended contour level is 644 nm^3; this corresponds to an approximate mass of 582 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 0.312 Å^{-1}

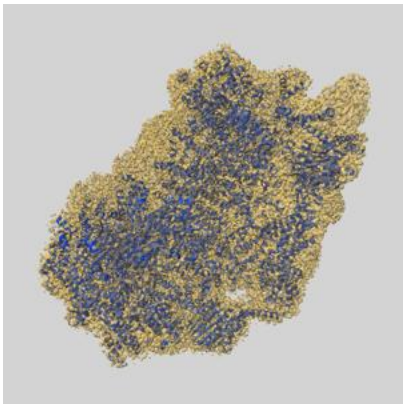
8 Fourier-Shell correlation (i)

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

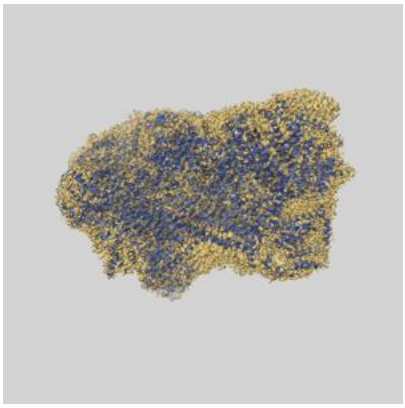
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-38424 and PDB model 8XKS. Per-residue inclusion information can be found in section 3 on page 10.

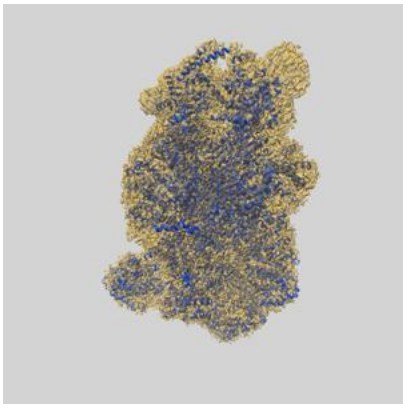
9.1 Map-model overlay



X



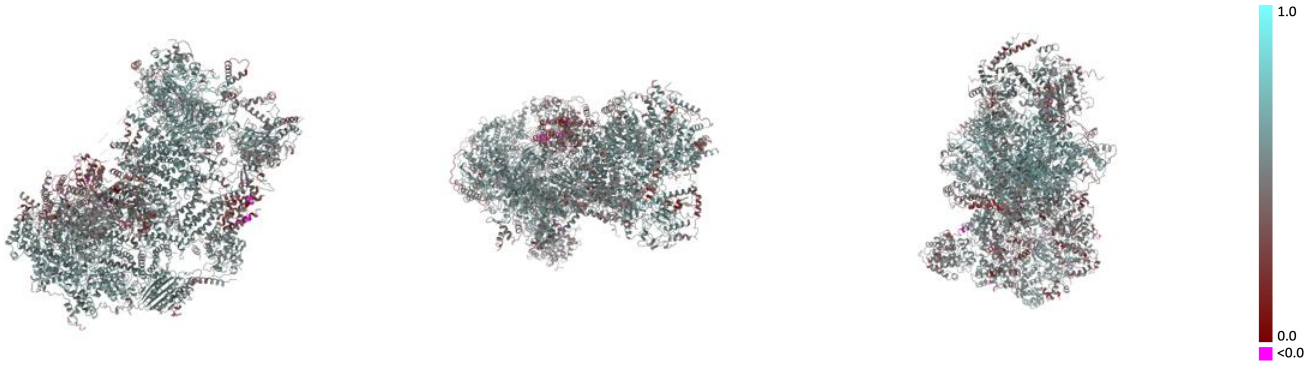
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.00943 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.

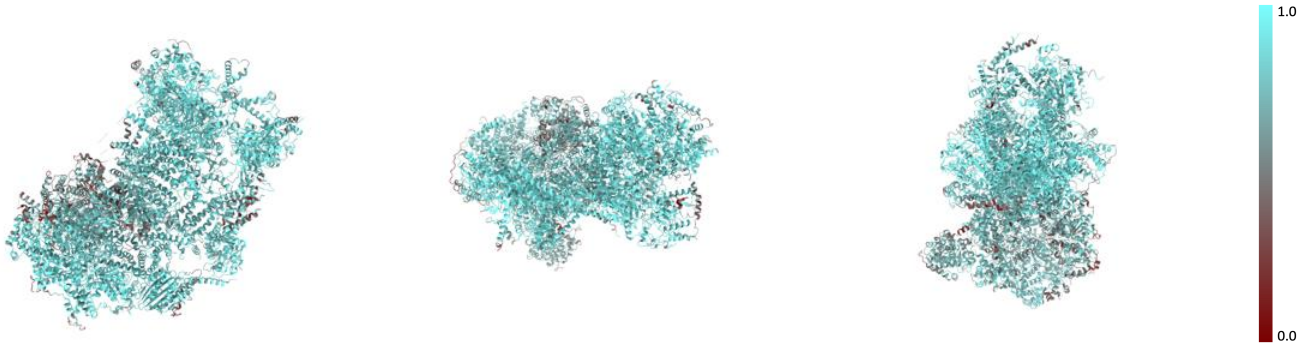
9.2 Q-score mapped to coordinate model



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.

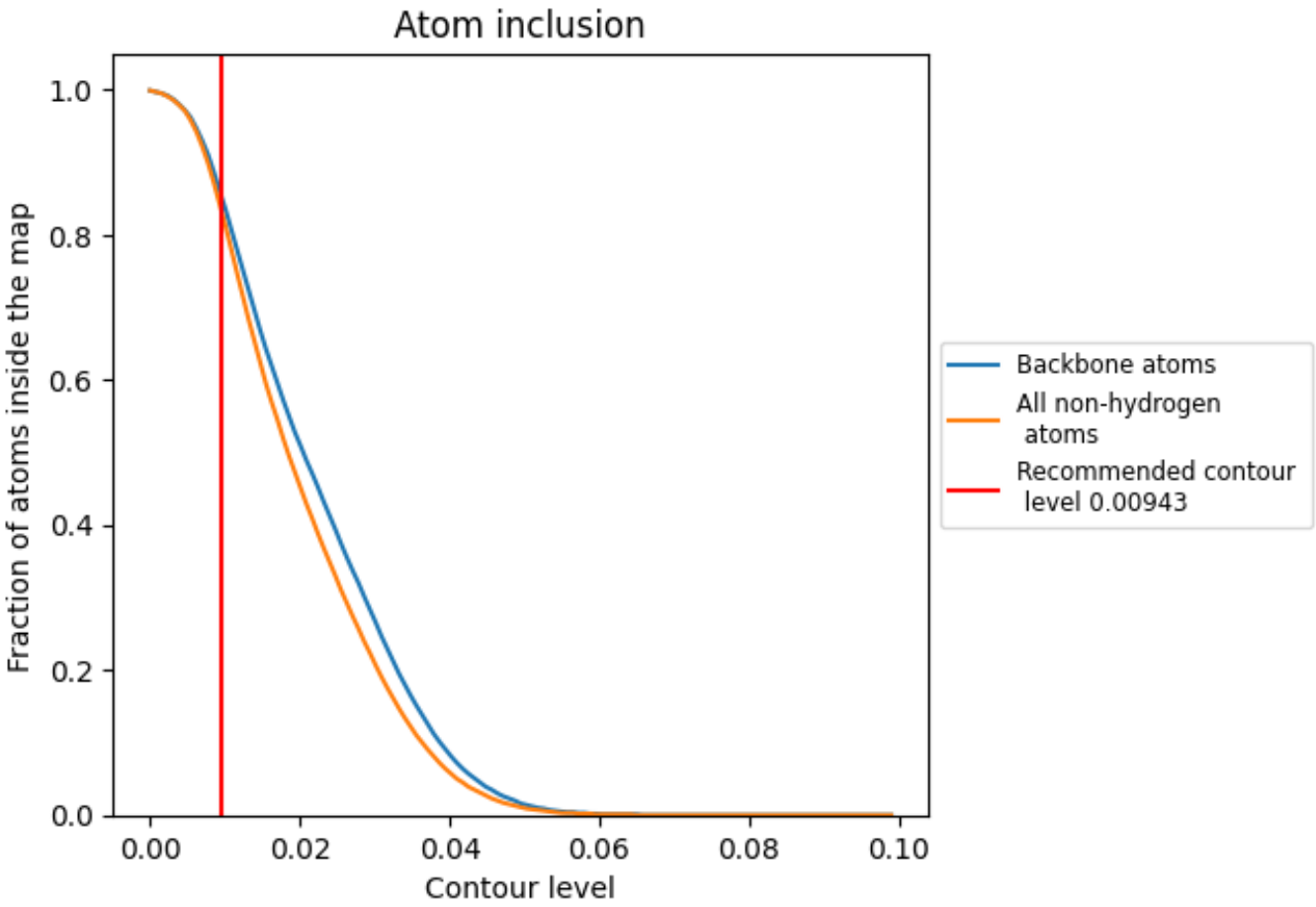
9.3 Atom inclusion mapped to coordinate model



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 (0.00943).

9.4 Atom inclusion (i)



At the recommended contour level, 86% of all backbone atoms, 84% 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 (0.00943) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8370	0.5110
A	0.8280	0.5030
B	0.7880	0.5030
C	0.8910	0.5550
D	0.8360	0.5250
E	0.8710	0.5370
F	0.8080	0.4820
G	0.8420	0.5100
H	0.8520	0.4910
I	0.8730	0.4820
J	0.8950	0.5490
K	0.8880	0.5240
L	0.9040	0.5420
M	0.8900	0.5450
N	0.8020	0.4790
O	0.7080	0.3800
P	0.8280	0.5150
Q	0.7010	0.4660
R	0.8300	0.4890
S	0.8830	0.5530
T	0.6920	0.4480