WORLDWIDE PDB

PROTEIN DATA BANK

wwPDB EM Validation Summary Report ⓘ

Sep 26, 2022 – 10:30 pm BST

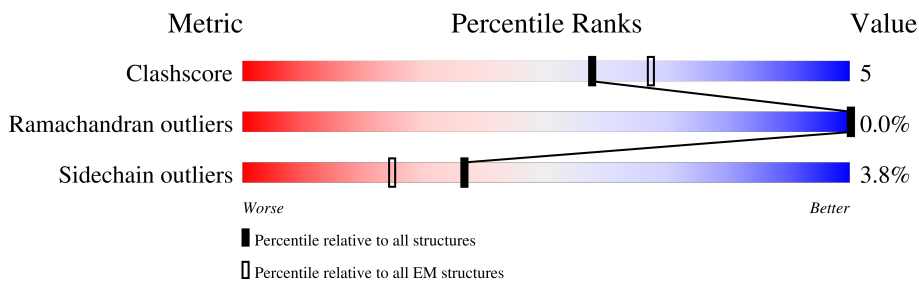|		
PDB ID	:	7ZC5
EMDB ID	:	EMD-14620
Title	:	Complex I from E. coli, DDM/LMNG-purified, under Turnover at pH 8, Resting state
Authors	:	Kravchuk, V.; Kampjut, D.; Sazanov, L.
Deposited on	:	2022-03-25
Resolution	:	3.00 Å(reported)
Based on initial models	:	4HEA, 3RKO

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1   Overall quality at a glance ⓘ

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

The reported resolution of this entry is 3.00 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.
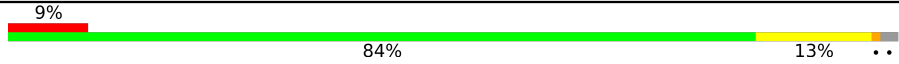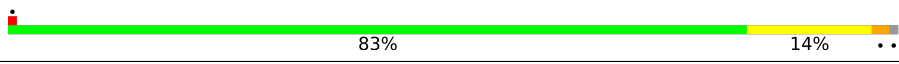
Metric	Percentile Ranks	Value
Clashscore		5
Ramachandran outliers		0.0%
Sidechain outliers		3.8%

Worse   *Better*

▮ Percentile relative to all structures

▯ Percentile relative to all EM structures

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	F	445	86% 13% •
2	E	166	83% 11% 6%
3	G	908	87% 12% •
4	C	600	• 82% 13% • 5%
5	B	220	61% 14% • 23%
6	I	180	68% 12% 19%
7	H	325	6% 78% 15% • 5%
8	A	147	• 58% 10% • 31%

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Mol	Chain	Length	Quality of chain
9	L	613	9% 84% 13%
10	M	509	83% 14%
11	N	485	81% 16%
12	K	100	76% 23%
13	J	184	6% 70% 18% 12%

2 Entry composition ⓘ

There are 20 unique types of molecules in this entry. The entry contains 36692 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 NADH-quinone oxidoreductase subunit F.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	F	442	Total 3432	C 2177	N 601	O 633	S 21	0	0

- Molecule 2 is a protein called NADH dehydrogenase I subunit E.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	E	156	Total 1220	C 768	N 215	O 229	S 8	0	0

- Molecule 3 is a protein called NADH-quinone oxidoreductase.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	G	905	Total 7022	C 4388	N 1269	O 1328	S 37	0	0

- Molecule 4 is a protein called NADH-quinone oxidoreductase subunit CD.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	C	571	Total 4597	C 2948	N 801	O 826	S 22	0	0

- Molecule 5 is a protein called NADH-quinone oxidoreductase subunit B.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	B	169	Total 1339	C 848	N 231	O 243	S 17	0	0

- Molecule 6 is a protein called NADH-quinone oxidoreductase subunit I.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	I	145	Total 1149	C 728	N 192	O 217	S 12	0	0

- Molecule 7 is a protein called NADH-quinone oxidoreductase subunit H.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
7	H	309	2422	1628	375	401	18	0	0

- Molecule 8 is a protein called NADH-quinone oxidoreductase subunit A.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
8	A	101	796	547	120	125	4	0	0

- Molecule 9 is a protein called NADH-quinone oxidoreductase subunit L.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
9	L	601	4595	3056	734	773	32	0	0

- Molecule 10 is a protein called NADH dehydrogenase I subunit M.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
10	M	504	3953	2661	617	646	29	0	0

- Molecule 11 is a protein called NADH-quinone oxidoreductase subunit N.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
11	N	480	3635	2427	574	614	20	0	0

- Molecule 12 is a protein called NADH-quinone oxidoreductase subunit K.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
12	K	100	760	494	132	129	5	0	0

- Molecule 13 is a protein called NADH-quinone oxidoreductase subunit J.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
13	J	162	1226	824	188	207	7	0	0

- Molecule 14 is IRON/SULFUR CLUSTER (three-letter code: SF4) (formula: Fe_4S_4).

Mol	Chain	Residues	Atoms			AltConf
14	F	1	Total	Fe	S	0
			8	4	4	
14	G	1	Total	Fe	S	0
			24	12	12	
14	G	1	Total	Fe	S	0
			24	12	12	
14	G	1	Total	Fe	S	0
			24	12	12	
14	B	1	Total	Fe	S	0
			8	4	4	
14	I	1	Total	Fe	S	0
			16	8	8	
14	I	1	Total	Fe	S	0
			16	8	8	

- Molecule 15 is FLAVIN MONONUCLEOTIDE (three-letter code: FMN) (formula: $C_{17}H_{21}N_4O_9P$).

FMN

Mol	Chain	Residues	Atoms					AltConf
15	F	1	Total	C	N	O	P	0
			31	17	4	9	1	

- Molecule 16 is 1,4-DIHYDRONICOTINAMIDE ADENINE DINUCLEOTIDE (three-letter code: NAI) (formula: $C_{21}H_{29}N_7O_{14}P_2$).

NAI
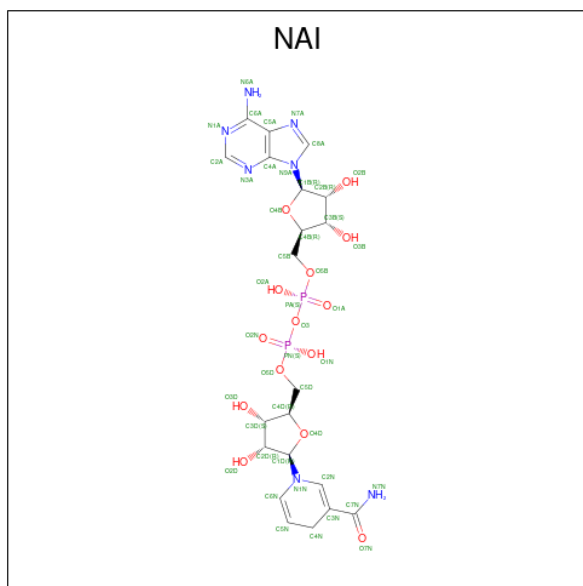
Mol	Chain	Residues	Atoms					AltConf
16	F	1	Total	C	N	O	P	0
			44	21	7	14	2	

- Molecule 17 is FE2/S2 (INORGANIC) CLUSTER (three-letter code: FES) (formula: Fe_2S_2).

Mol	Chain	Residues	Atoms			AltConf
17	E	1	Total	Fe	S	0
			4	2	2	
17	G	1	Total	Fe	S	0
			4	2	2	

- Molecule 18 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		AltConf
18	G	1	Total	Ca	0
			1	1	

- Molecule 19 is EICOSANE (three-letter code: LFA) (formula: $C_{20}H_{42}$).
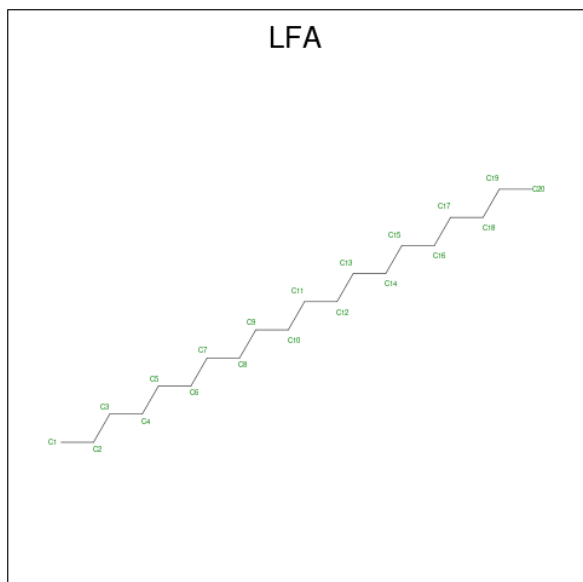
Mol	Chain	Residues	Atoms		AltConf
19	H	1	Total	C	0
			20	20	
19	A	1	Total	C	0
			20	20	
19	L	1	Total	C	0
			20	20	
19	M	1	Total	C	0
			20	20	
19	N	1	Total	C	0
			20	20	

- Molecule 20 is 1,2-Distearoyl-sn-glycerophosphoethanolamine (three-letter code: 3PE) (formula: $C_{41}H_{82}NO_8P$).

3PE

Mol	Chain	Residues	Atoms					AltConf
20	A	1	Total	C	N	O	P	0
			51	41	1	8	1	
20	L	1	Total	C	N	O	P	0
			153	123	3	24	3	
20	L	1	Total	C	N	O	P	0
			153	123	3	24	3	
20	L	1	Total	C	N	O	P	0
			153	123	3	24	3	
20	M	1	Total	C	N	O	P	0
			51	41	1	8	1	
20	J	1	Total	C	N	O	P	0
			51	41	1	8	1	

3   Residue-property plots ⓘ

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

- Molecule 1: NADH-quinone oxidoreductase subunit F
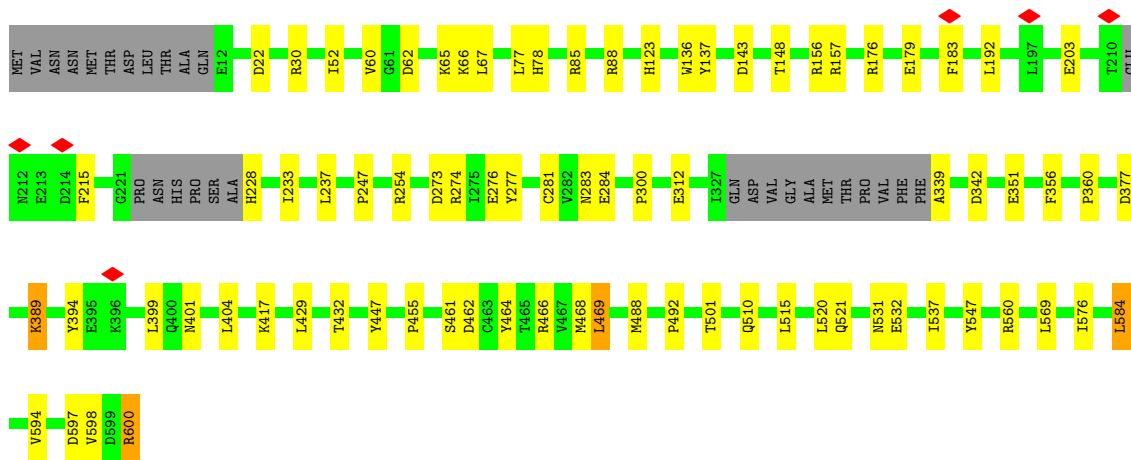
Chain F:

- Molecule 2: NADH dehydrogenase I subunit E

Chain E:

- Molecule 3: NADH-quinone oxidoreductase

Chain G:
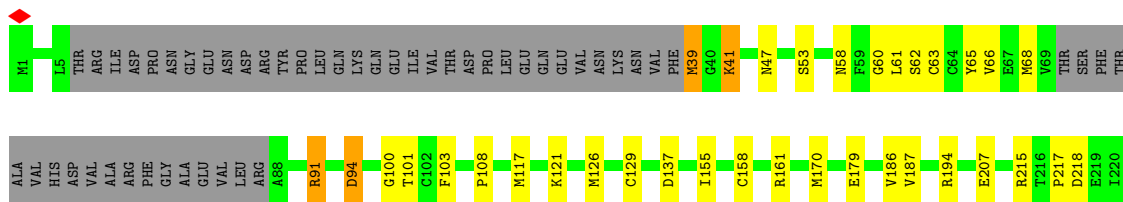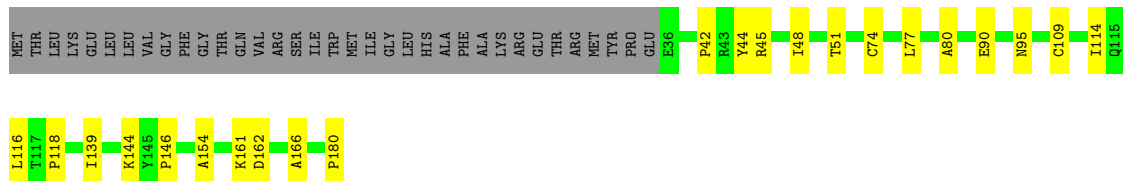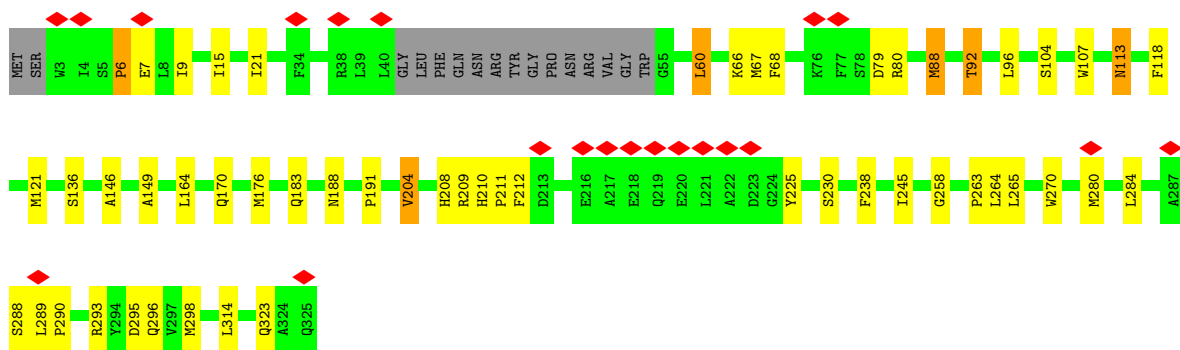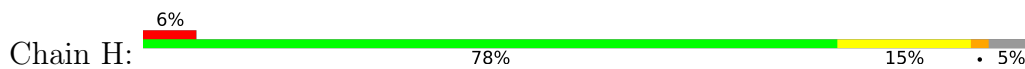

- Molecule 4: NADH-quinone oxidoreductase subunit CD

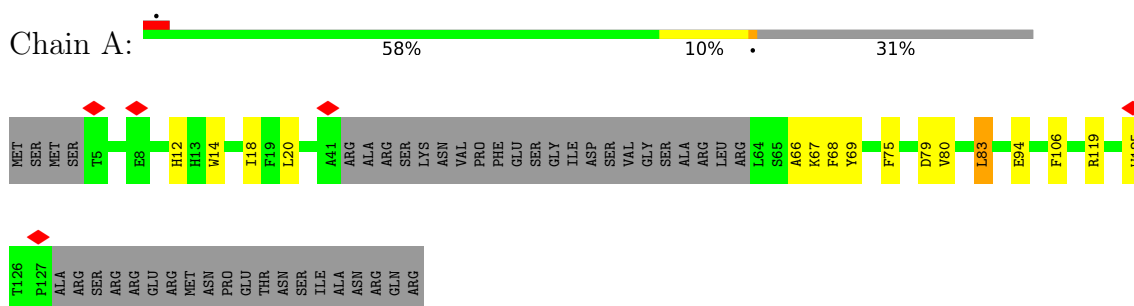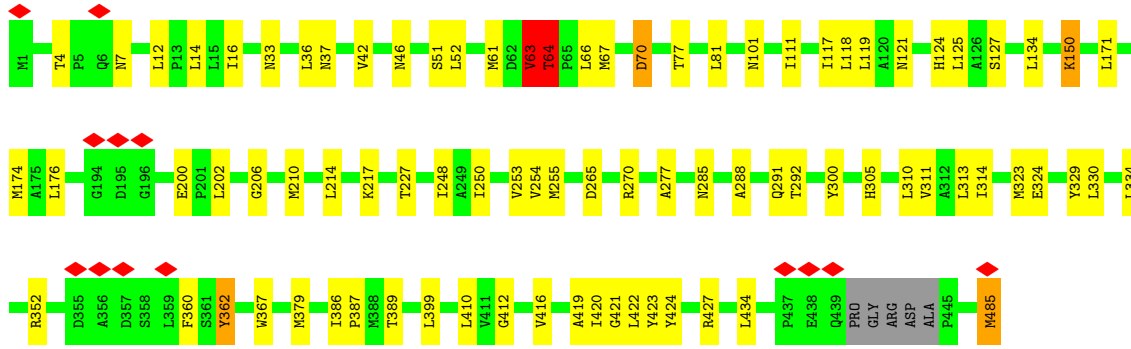Chain C:

MET VAL ASN ASN MET THR ASP LEU THR ALA GLN E12 D22 R30 I52 V60 G61 D62 K65 K66 L67 L77 H78 R85 R88 H123 W136 Y137 D143 T148 R156 R157 R176 E179 F183 L192 L197 E203 T210 GLU

N212 E213 D214 F215 G221 PRO ASN HIS PRO SER ALA H228 I233 L237 P247 R254 D273 R274 I275 E276 Y277 C281 V282 N283 E284 P300 E312 I327 GLN ASP VAL GLY ALA MET THR PRO VAL PHE PHE A339 D342 E351 F356 P360 D377

K389 Y394 E395 K396 L399 Q400 N401 L404 K417 L429 T432 Y447 P455 S461 D462 C463 Y464 T465 R466 V467 M468 L469 M488 P492 T501 Q510 L515 L520 Q521 N531 E532 I537 Y547 R560 L569 I576 L584

V594 D597 V598 D599 R600

- Molecule 5: NADH-quinone oxidoreductase subunit B

Chain B: 61%   14%   ·   23%

M1 L5 THR ARG ILE ASP PRO ASN GLY GLU ASN ASP ARG TYR PRO LEU GLN LYS GLN ILE VAL THR ASP PRO LEU GLN GLU VAL ASN LYS VAL PHE M39 G40 K41 N47 S53 N58 F59 G60 L61 S62 C63 C64 Y65 V66 E67 M68 V69 THR SER PHE THR

ALA VAL HIS ASP VAL ALA ARG PHE GLY ALA GLU VAL LEU ARG A88 R91 D94 G100 T101 C102 F103 P108 M117 K121 M126 C129 D137 I155 C158 R161 M170 E179 V186 V187 R194 E207 R215 T216 P217 D218 E219 I220

- Molecule 6: NADH-quinone oxidoreductase subunit I

Chain I: 68%   12%   19%

MET THR LEU LYS GLU LEU LEU VAL GLY PHE GLY THR GLN VAL ARG SER ILE TRP MET ILE GLY LEU HIS ALA PHE ALA LYS ARG GLU THR ARG MET TYR PRO GLU E36 P42 R43 Y44 R45 I48 T51 C74 L77 A80 E90 N95 C109 I114 Q115

L116 T117 P118 I139 K144 Y145 P146 A154 K161 D162 A166 P180

- Molecule 7: NADH-quinone oxidoreductase subunit H

6%

Chain H: 78%   15%   ·   5%

MET SER W3 I4 S5 P6 E7 L8 I9 I15 I21 F34 R38 L39 L40 GLY LEU PHE GLN ASN ARG TYR GLY PRO ASN ARG VAL GLY TRP G55 L60 K66 M67 F68 K76 F77 S78 D79 R80 M88 T92 L96 S104 W107 N113 F118

M121 S136 A146 A149 L164 Q170 M176 Q183 N188 P191 V204 H208 R209 H210 P211 F212 D213 E216 A217 E218 Q219 E220 L221 A222 D223 G224 Y225 S230 F238 I245 G258 P263 L264 L265 W270 M280 L284 A287

S288 L289 P290 R293 Y294 D295 Q296 V297 M298 L314 Q323 A324 Q325

• Molecule 8: NADH-quinone oxidoreductase subunit A

Chain A:

58%   10%   31%

MET SER MET SER T5 E8 H12 H13 W14 I18 F19 L20 A41 ARG ALA ARG SER LYS ASN VAL PRO PHE GLU SER ILE ASP SER VAL GLY SER ALA ARG LEU ARG L64 S65 A66 K67 F68 Y69 F75 D79 V80 L83 E94 F106 R119 W125

T126 P127 ALA SER ARG ARG GLU ARG MET ASN PRO GLU THR ASN ILE ALA ASN SER ARG GLN ARG

• Molecule 9: NADH-quinone oxidoreductase subunit L

9%

Chain L:

84%   13%

M1 N2 M3 L4 P11 L12 E57 W65 I75 G76 F77 L81 D82 S85 A103 Y106 E111 F123 I124 A125 D134 N135 L136 L137 M139 V173 D178 V179 N196 A209 D210 G211 M214 L222 L223 S230 L233 P234 A240

M243 T257 T260 V263 Y264 L265 R268 F273 I274 M275 E278 V279 L280 V283 K305 R306 A309 Y310 S311 I316 G317 Y318 L323 L335 K342 A343 L344 C356 H357 H358 E359 Q360 K364 K370 S371 L374 C378 F379 A385

L389 P390 L391 V392 T393 A394 G395 F396 I412 M415 G418 G421 M424 T425 F430 R431 G439 LYS GLU GLN ILE HIS ALA HIS ALA VAL LYS GLY VAL T452 H453 S454 L455 P456 L457 L460 L461 L462 L463 S464 T465 F466 V467 G468 A469 L470 I471 L475 Q476 Q481

T482 T483 E484 L485 A486 H487 G488 S489 M490 L491 E494 I495 V499 V500 A501 V502 I505 L506 W512 A526 R529 D542 K547 R562 D563 M568 I571 P572 F578 S599 R613

• Molecule 10: NADH dehydrogenase I subunit M

Chain M:

83%   14%

M1 L2 L3 L42 S65 R74 I79 A82 I83 D84 W106 K107 F115 H116 H117 L118 N119 L120 M121 W122 I123 L132 A133 I134 L138 F141 E144 M145 P149 M150 Y151 H159 D163 F174 F175 S181 V202 M215 E220 M224

A230 P236 D246 A247 H248 P252 T253 V257 D258 L259 I262 L263 L264 F279 A282 F299 Y300 W303 F306 L314 I315 T318 S319 V320 T332 Y338 Q339 A352 L355 R365 T368 M373 F404 V405 F408 M409 F415

Q416 V417 V418 T422 V423 I424 S425 T426 V430 F431 A432 Y435 R442 Q451 I452 A453 R463 E464 S489 I493 V504 THR THR THR ARG PRO

• Molecule 11: NADH-quinone oxidoreductase subunit N

Chain N:

81%   16%

• Molecule 12: NADH-quinone oxidoreductase subunit K

Chain K:

• Molecule 13: NADH-quinone oxidoreductase subunit J

Chain J:

4 Experimental information ⓘ

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	82734	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose $(e^-/\text{Å}^2)$	80	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	2000	Depositor
Magnification	81000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.358	Depositor
Minimum map value	-0.014	Depositor
Average map value	0.004	Depositor
Map value standard deviation	0.015	Depositor
Recommended contour level	0.035	Depositor
Map size (Å)	151.57999, 207.76, 248.04	wwPDB
Map dimensions	143, 196, 234	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.06, 1.06, 1.06	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: NAI, FMN, LFA, CA, FES, SF4, 3PE

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	F	0.38	0/3511	0.56	0/4745
2	E	0.36	0/1248	0.55	0/1691
3	G	0.39	0/7173	0.56	1/9726 (0.0%)
4	C	0.39	0/4719	0.58	1/6400 (0.0%)
5	B	0.40	0/1367	0.60	0/1847
6	I	0.47	0/1176	0.58	0/1590
7	H	0.34	0/2492	0.62	2/3391 (0.1%)
8	A	0.31	0/821	0.57	0/1119
9	L	0.29	0/4713	0.53	2/6423 (0.0%)
10	M	0.32	0/4074	0.54	0/5546
11	N	0.33	0/3724	0.55	2/5081 (0.0%)
12	K	0.34	0/769	0.57	0/1040
13	J	0.35	0/1252	0.57	1/1708 (0.1%)
All	All	0.36	0/37039	0.56	9/50307 (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
2	E	0	1
3	G	0	1
9	L	0	1
11	N	0	2
All	All	0	5

There are no bond length outliers.

The worst 5 of 9 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
7	H	6	PRO	CA-N-CD	-8.63	99.42	111.50
3	G	67	MET	CB-CG-SD	-7.01	91.36	112.40
4	C	399	LEU	CA-CB-CG	6.18	129.50	115.30
7	H	284	LEU	CA-CB-CG	5.66	128.32	115.30
9	L	214	MET	CB-CG-SD	5.46	128.78	112.40

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	E	145	ILE	Peptide
3	G	260	ASN	Peptide
9	L	257	THR	Peptide
11	N	63	VAL	Peptide
11	N	64	THR	Peptide

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	F	3432	0	3405	34	0
2	E	1220	0	1187	11	0
3	G	7022	0	6824	57	0
4	C	4597	0	4506	46	0
5	B	1339	0	1330	27	0
6	I	1149	0	1114	15	0
7	H	2422	0	2469	29	0
8	A	796	0	804	15	0
9	L	4595	0	4736	43	0
10	M	3953	0	4053	44	0
11	N	3635	0	3802	49	0
12	K	760	0	817	17	0
13	J	1226	0	1297	24	0
14	B	8	0	0	1	0
14	F	8	0	0	1	0
14	G	24	0	0	1	0
14	I	16	0	0	0	0
15	F	31	0	19	0	0

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Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
16	F	44	0	27	3	0
17	E	4	0	0	0	0
17	G	4	0	0	0	0
18	G	1	0	0	0	0
19	A	20	0	42	0	0
19	H	20	0	42	1	0
19	L	20	0	42	0	0
19	M	20	0	42	1	0
19	N	20	0	42	1	0
20	A	51	0	82	1	0
20	J	51	0	82	4	0
20	L	153	0	246	5	0
20	M	51	0	82	3	0
All	All	36692	0	37092	372	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 5.

The worst 5 of 372 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)
9:L:243:MET:HE1	9:L:309:ALA:HB2	1.65	0.78
1:F:95:GLU:HB2	16:F:503:NAI:H42N	1.66	0.78
11:N:63:VAL:O	11:N:67:MET:HB2	1.82	0.78
9:L:356:CYS:HB3	9:L:360:GLN:HE22	1.49	0.77
2:E:143:MET:HB2	2:E:153:LEU:HD11	1.68	0.75

There are no symmetry-related clashes.

5.3　Torsion angles ⓘ

5.3.1　Protein backbone ⓘ

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	F	440/445 (99%)	430 (98%)	10 (2%)	0	100	100
2	E	154/166 (93%)	150 (97%)	4 (3%)	0	100	100
3	G	903/908 (99%)	872 (97%)	31 (3%)	0	100	100
4	C	563/600 (94%)	548 (97%)	15 (3%)	0	100	100
5	B	163/220 (74%)	153 (94%)	10 (6%)	0	100	100
6	I	143/180 (79%)	140 (98%)	3 (2%)	0	100	100
7	H	305/325 (94%)	293 (96%)	12 (4%)	0	100	100
8	A	97/147 (66%)	97 (100%)	0	0	100	100
9	L	597/613 (97%)	576 (96%)	21 (4%)	0	100	100
10	M	502/509 (99%)	493 (98%)	9 (2%)	0	100	100
11	N	476/485 (98%)	463 (97%)	12 (2%)	1 (0%)	47	82
12	K	98/100 (98%)	96 (98%)	2 (2%)	0	100	100
13	J	160/184 (87%)	153 (96%)	7 (4%)	0	100	100
All	All	4601/4882 (94%)	4464 (97%)	136 (3%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
11	N	64	THR

5.3.2   Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	F	356/359 (99%)	343 (96%)	13 (4%)	34	70
2	E	129/139 (93%)	128 (99%)	1 (1%)	81	93
3	G	732/735 (100%)	708 (97%)	24 (3%)	38	73
4	C	486/519 (94%)	470 (97%)	16 (3%)	38	73
5	B	146/192 (76%)	139 (95%)	7 (5%)	25	62
6	I	124/154 (80%)	123 (99%)	1 (1%)	81	93

Continued on next page...

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
7	H	255/269 (95%)	238 (93%)	17 (7%)	16	49
8	A	79/119 (66%)	75 (95%)	4 (5%)	24	60
9	L	477/486 (98%)	458 (96%)	19 (4%)	31	68
10	M	413/418 (99%)	395 (96%)	18 (4%)	28	65
11	N	381/385 (99%)	368 (97%)	13 (3%)	37	72
12	K	79/79 (100%)	73 (92%)	6 (8%)	13	43
13	J	128/146 (88%)	122 (95%)	6 (5%)	26	63
All	All	3785/4000 (95%)	3640 (96%)	145 (4%)	36	69

5 of 145 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
10	M	373	MET
13	J	100	SER
10	M	435	TYR
11	N	324	GLU
4	C	469	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
2	E	106	GLN
3	G	283	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates ⓘ

There are no monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 23 ligands modelled in this entry, 1 is monoatomic - leaving 22 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	#$|Z| > 2$
19	LFA	M	1002	-	19,19,19	0.17	0	18,18,18	0.15	0
19	LFA	N	601	-	19,19,19	0.12	0	18,18,18	0.14	0
14	SF4	I	201	6	0,12,12	-	-	-		
19	LFA	H	601	-	19,19,19	0.15	0	18,18,18	0.14	0
14	SF4	B	301	5	0,12,12	-	-	-		
14	SF4	F	501	1	0,12,12	-	-	-		
20	3PE	M	1001	-	50,50,50	0.30	0	53,55,55	0.29	0
14	SF4	G	1002	3	0,12,12	-	-	-		
20	3PE	L	801	-	50,50,50	0.30	0	53,55,55	0.27	0
19	LFA	L	803	-	19,19,19	0.15	0	18,18,18	0.11	0
16	NAI	F	503	-	42,48,48	0.52	0	47,73,73	0.53	1 (2%)
20	3PE	L	804	-	50,50,50	0.30	0	53,55,55	0.30	0
20	3PE	J	301	-	50,50,50	0.31	0	53,55,55	0.33	0
20	3PE	L	802	-	50,50,50	0.30	0	53,55,55	0.30	0
14	SF4	I	202	6	0,12,12	-	-	-		
17	FES	E	201	2	0,4,4	-	-	-		
14	SF4	G	1003	3	0,12,12	-	-	-		
19	LFA	A	201	-	19,19,19	0.15	0	18,18,18	0.20	0
14	SF4	G	1001	3	0,12,12	-	-	-		
20	3PE	A	202	-	50,50,50	0.29	0	53,55,55	0.28	0
15	FMN	F	502	-	33,33,33	1.12	3 (9%)	48,50,50	1.32	6 (12%)
17	FES	G	1004	3	0,4,4	-	-	-		

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
19	LFA	M	1002	-	-	3/17/17/17	-
19	LFA	N	601	-	-	0/17/17/17	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
14	SF4	I	201	6	-	-	0/6/5/5
19	LFA	H	601	-	-	1/17/17/17	-
14	SF4	B	301	5	-	-	0/6/5/5
14	SF4	F	501	1	-	-	0/6/5/5
20	3PE	M	1001	-	-	8/54/54/54	-
14	SF4	G	1002	3	-	-	0/6/5/5
20	3PE	L	801	-	-	8/54/54/54	-
19	LFA	L	803	-	-	1/17/17/17	-
16	NAI	F	503	-	-	8/25/72/72	0/5/5/5
20	3PE	L	804	-	-	13/54/54/54	-
20	3PE	J	301	-	-	12/54/54/54	-
20	3PE	L	802	-	-	15/54/54/54	-
14	SF4	I	202	6	-	-	0/6/5/5
17	FES	E	201	2	-	-	0/1/1/1
14	SF4	G	1003	3	-	-	0/6/5/5
19	LFA	A	201	-	-	1/17/17/17	-
14	SF4	G	1001	3	-	-	0/6/5/5
20	3PE	A	202	-	-	9/54/54/54	-
15	FMN	F	502	-	-	9/18/18/18	0/3/3/3
17	FES	G	1004	3	-	-	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
15	F	502	FMN	C4A-N5	3.29	1.37	1.30
15	F	502	FMN	C4A-C10	-2.04	1.38	1.44
15	F	502	FMN	C10-N1	2.02	1.37	1.33

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

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
15	F	502	FMN	C4-N3-C2	-3.36	119.44	125.64
15	F	502	FMN	C4A-C10-N10	2.95	120.80	116.48
15	F	502	FMN	C4A-C4-N3	2.72	120.09	113.19
15	F	502	FMN	O4-C4-C4A	-2.59	119.73	126.60
16	F	503	NAI	C5A-C6A-N6A	2.33	123.89	120.35

There are no chirality outliers.

5 of 88 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
15	F	502	FMN	N10-C1'-C2'-O2'
15	F	502	FMN	C5'-O5'-P-O2P
15	F	502	FMN	C5'-O5'-P-O3P
16	F	503	NAI	C5B-O5B-PA-O1A
16	F	503	NAI	C5B-O5B-PA-O3

There are no ring outliers.

13 monomers are involved in 21 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
19	M	1002	LFA	1	0
19	N	601	LFA	1	0
19	H	601	LFA	1	0
14	B	301	SF4	1	0
14	F	501	SF4	1	0
20	M	1001	3PE	3	0
20	L	801	3PE	2	0
16	F	503	NAI	3	0
20	L	804	3PE	1	0
20	J	301	3PE	4	0
20	L	802	3PE	3	0
14	G	1003	SF4	1	0
20	A	202	3PE	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 LFA M 1002

Bond lengths

Bond angles

Torsions

Rings

Ligand LFA H 601

Bond lengths

Bond angles

Torsions

Rings

Ligand 3PE M 1001

Bond lengths

Bond angles

Torsions

Rings

Ligand 3PE L 801

Bond lengths

Bond angles

Torsions

Rings

Ligand LFA L 803

Bond lengths

Bond angles

Torsions

Rings

Ligand NAI F 503

Bond lengths

Bond angles

Torsions

Rings

Ligand 3PE L 804

Bond lengths

Bond angles

Torsions

Rings

Ligand 3PE J 301

Bond lengths

Bond angles

Torsions

Rings

Ligand 3PE L 802

Bond lengths

Bond angles

Torsions

Rings

Ligand LFA A 201

Bond lengths

Bond angles

Torsions

Rings

Ligand 3PE A 202

Bond lengths

Bond angles

Torsions

Rings

Ligand FMN F 502

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6   Map visualisation ⓘ

This section contains visualisations of the EMDB entry EMD-14620. 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
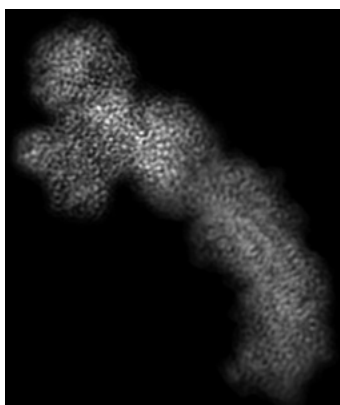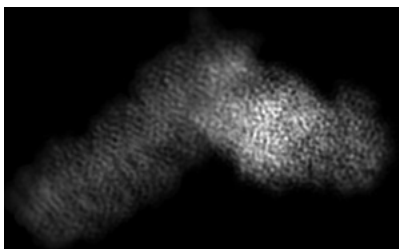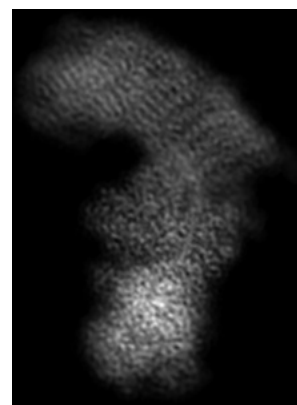
The images above show the map projected in three orthogonal directions.

6.2   Central slices ⓘ
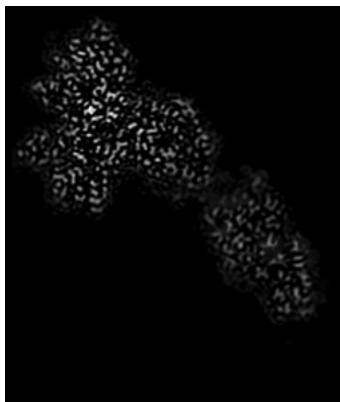
6.2.1   Primary map
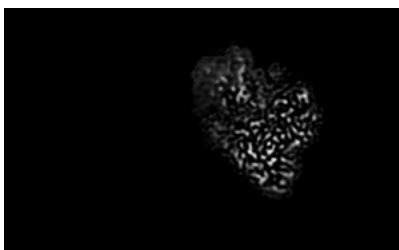
X Index: 71   Y Index: 98   Z Index: 117

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

6.3 Largest variance slices ⓘ
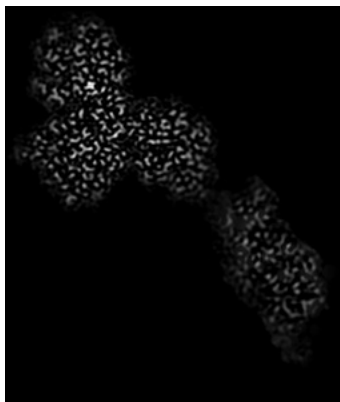
6.3.1 Primary map

| X Index: 65 | Y Index: 50 | Z Index: 154 |

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

6.4 Orthogonal surface views ⓘ

6.4.1 Primary map

| X | Y | Z |

The images above show the 3D surface view of the map at the recommended contour level 0.035. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5 Mask visualisation ⓘ

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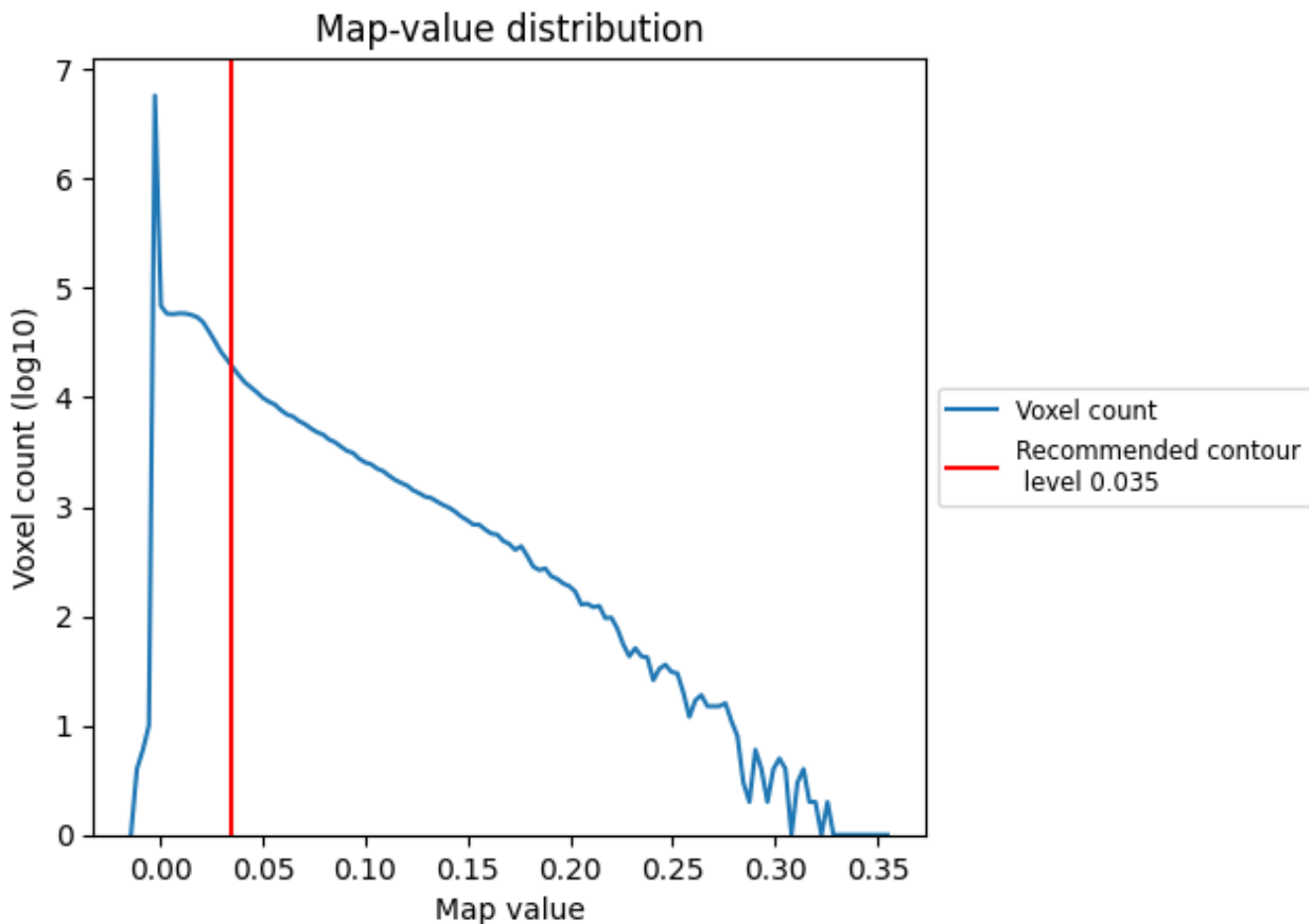
The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

7.2 Volume estimate ⓘ
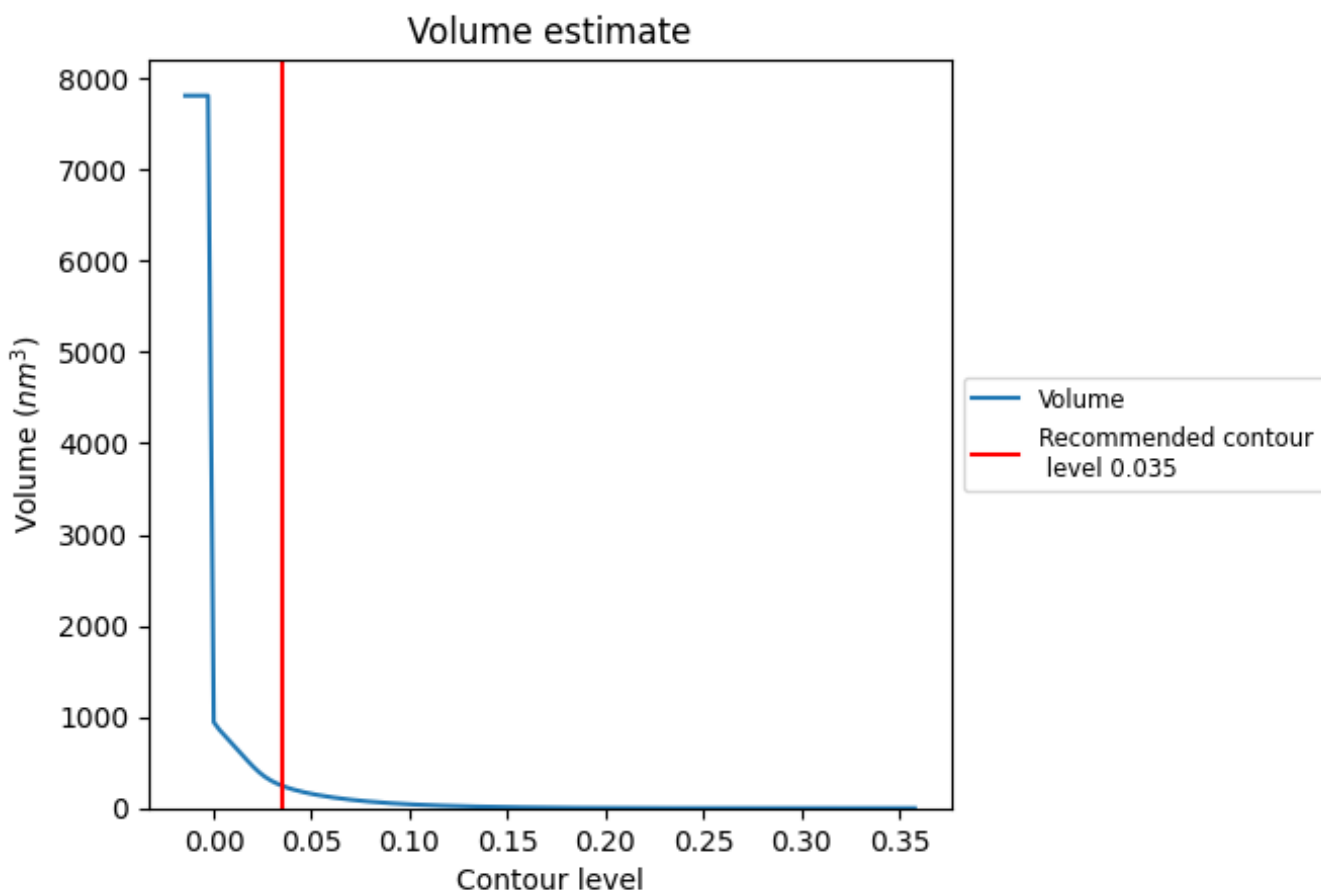
The volume at the recommended contour level is 246 nm^3; this corresponds to an approximate mass of 222 kDa.

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 ⓘ

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

8 Fourier-Shell correlation ⓘ

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC ⓘ
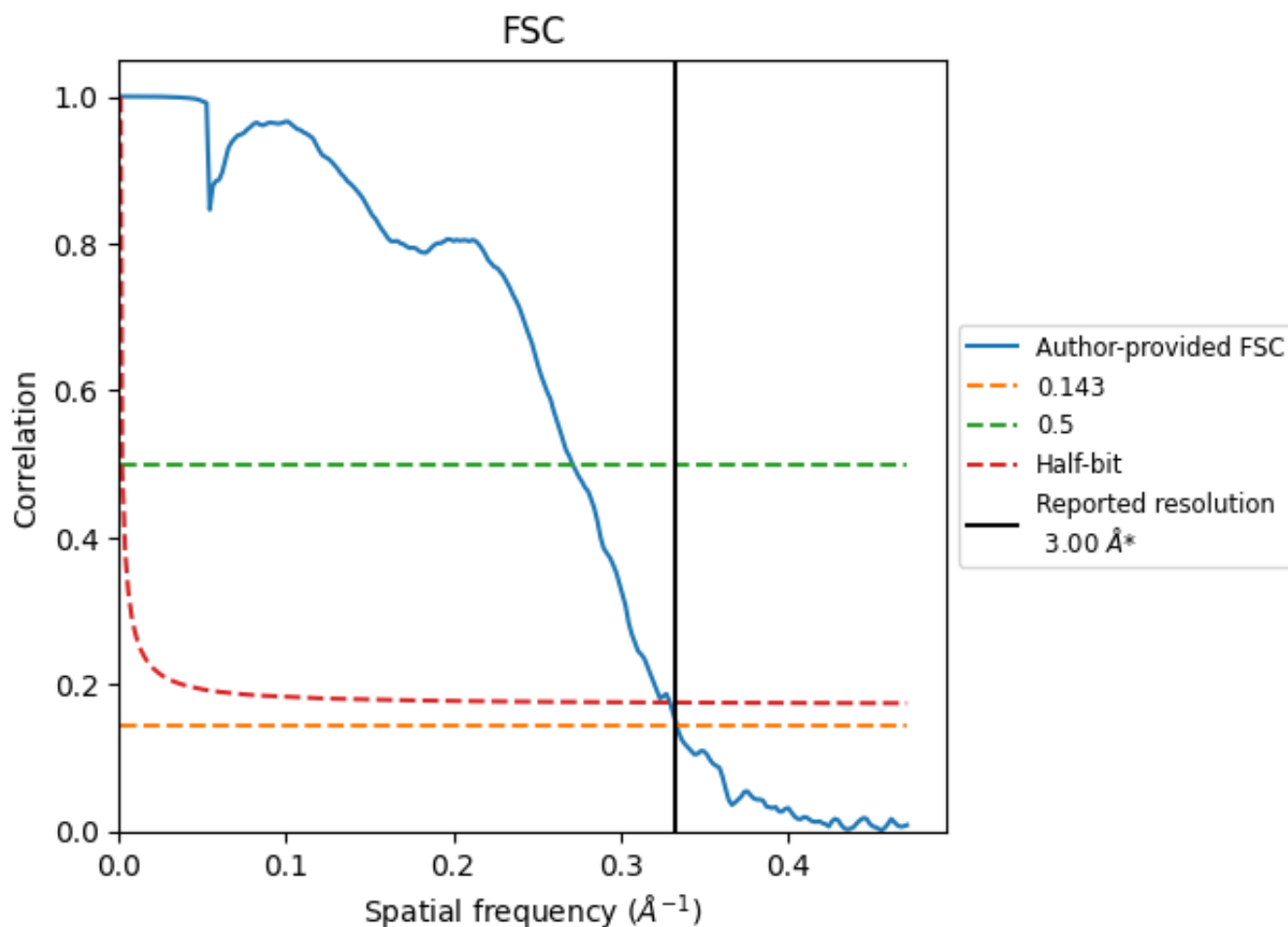
*Reported resolution corresponds to spatial frequency of 0.333 Å^{-1}

8.2   Resolution estimates ⓘ

Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.00	-	-
Author-provided FSC curve	2.99	3.68	3.03
Unmasked-calculated*	-	-	-

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

9 Map-model fit ⓘ

This section contains information regarding the fit between EMDB map EMD-14620 and PDB model 7ZC5. Per-residue inclusion information can be found in section 3 on page 10.

9.1 Map-model overlay ⓘ

| X | Y | Z |
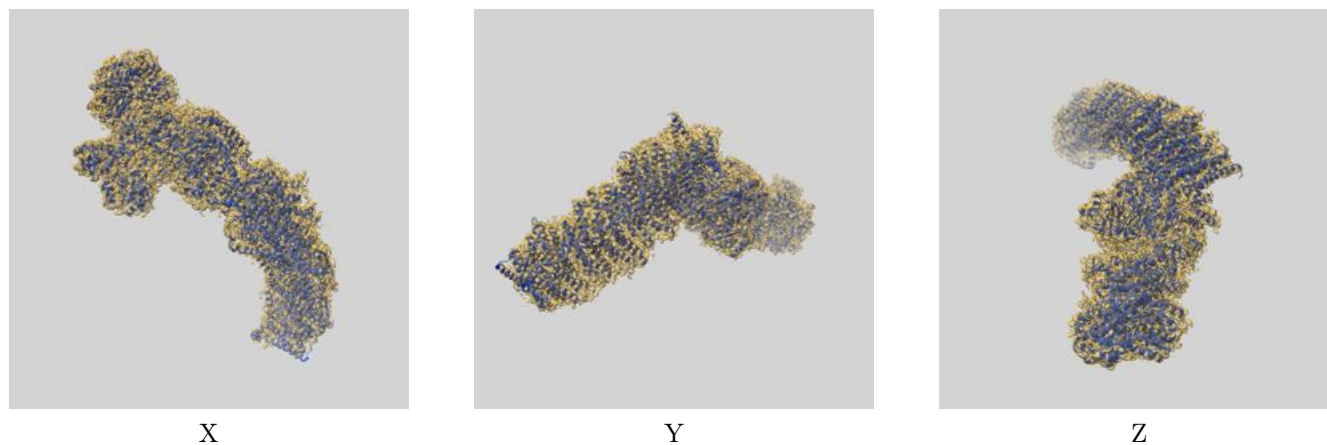
The images above show the 3D surface view of the map at the recommended contour level 0.035 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2   Q-score mapped to coordinate model ⓘ

X   Y   Z
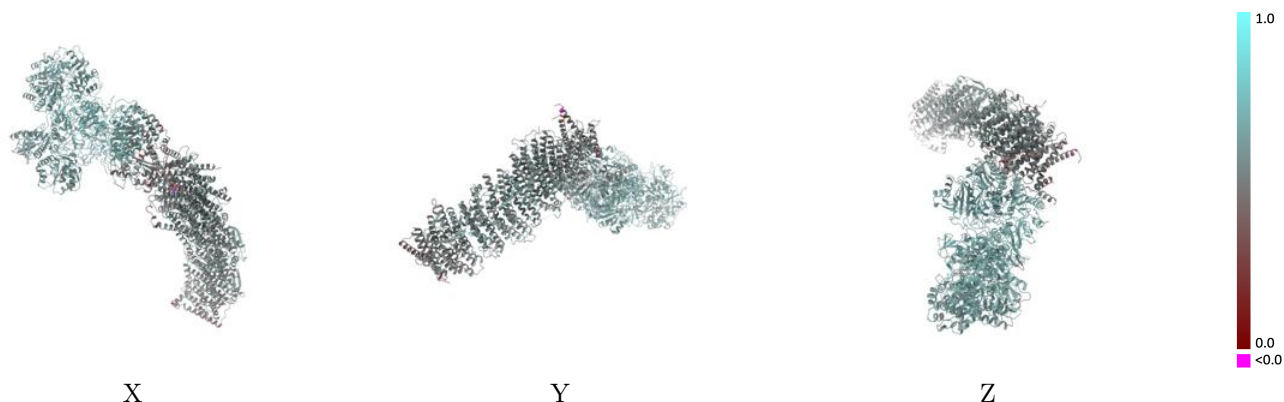
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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
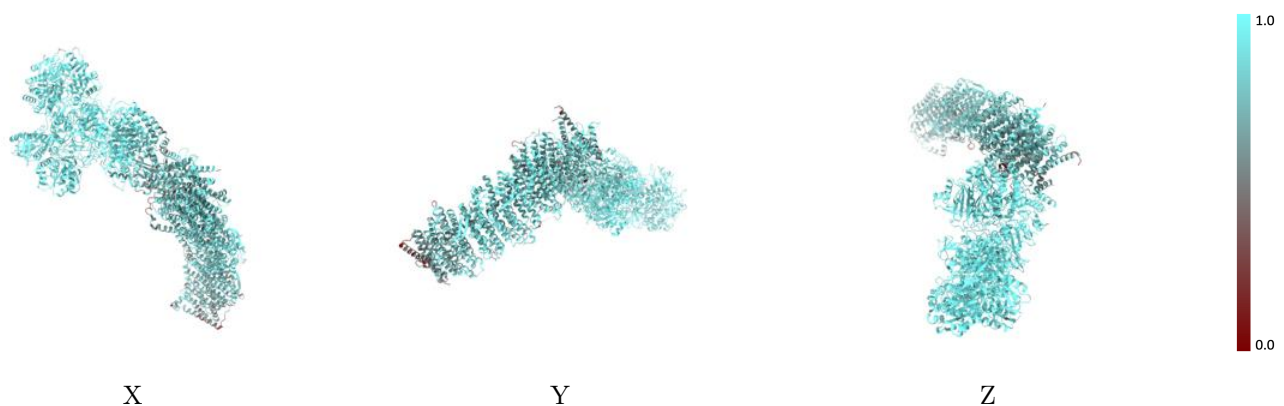
The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.035).

9.4 Atom inclusion ⓘ
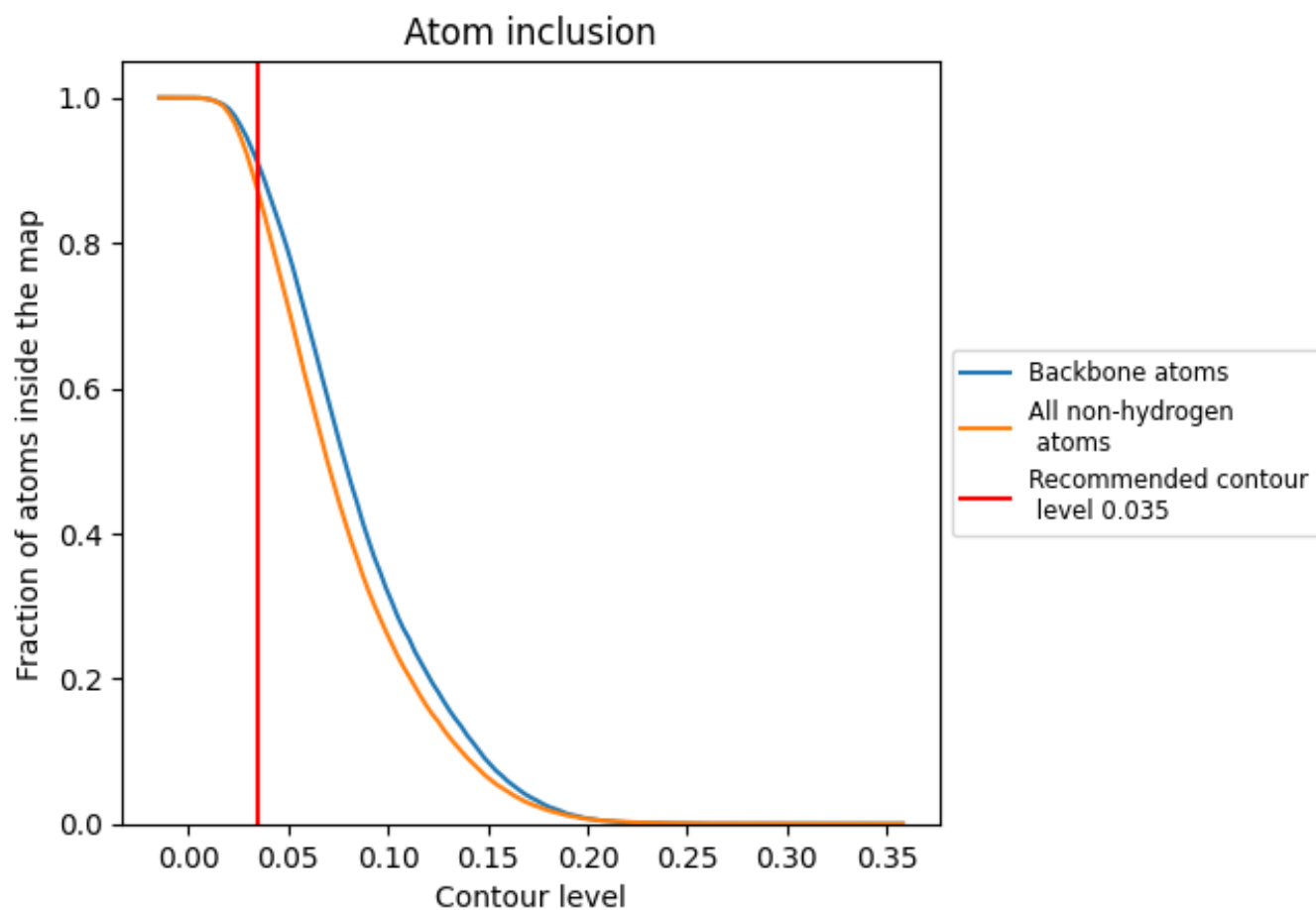
At the recommended contour level, 91% of all backbone atoms, 87% of all non-hydrogen atoms, are inside the map.

9.5   Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.035) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8708	0.5710
A	0.7474	0.4900
B	0.9557	0.6010
C	0.9359	0.6150
E	0.9509	0.6160
F	0.9433	0.6150
G	0.9590	0.6360
H	0.7444	0.4720
I	0.9762	0.6630
J	0.7676	0.4880
K	0.8497	0.5290
L	0.7118	0.4980
M	0.8525	0.5420
N	0.8425	0.5390

1.0

0.0
<0.0