Full wwPDB EM Validation Report

Mar 27, 2026 – 06:21 AM UTC

PDB ID	:	8PR3 / pdb_00008pr3
EMDB ID	:	EMD-17833
Title	:	Cytoplasmic dynein-1 heavy chain bound to JIP3-RH1
Authors	:	Singh, K.; Lau, C.K.; Manigrasso, G.; Gassmann, R.; Carter, A.P.
Deposited on	:	2023-07-12
Resolution	:	3.90 Å(reported)
Based on initial model	:	7Z8G

This is a Full wwPDB EM Validation 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:

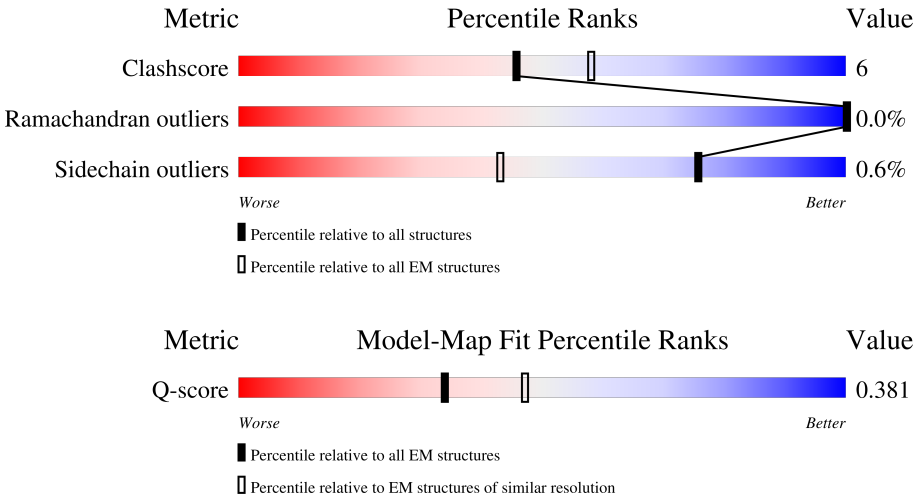
EMDB validation analysis	:	0.0.1.dev132
MolProbity	:	4-5-2 with Phenix2.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics	:	202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

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 3.90 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)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	8855 (3.40 - 4.40)

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	B	581	16% · 82%
1	C	581	15% · 82%
2	f	4646	8% · 91%
2	m	4646	10% · 89%

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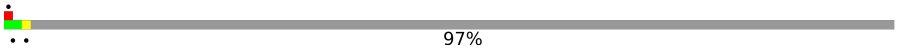
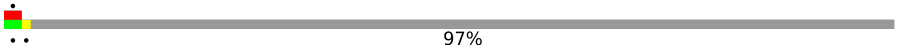
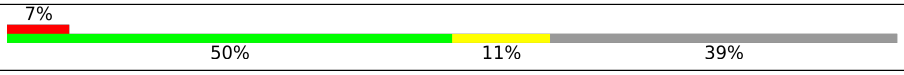
Mol	Chain	Length	Quality of chain
3	h	612	
3	o	612	
4	E	492	
4	F	492	
4	j	492	

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 17888 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 C-Jun-amino-terminal kinase-interacting protein 3.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	B	105	Total	C	N	O	S	0	0
			880	548	148	181	3		
1	C	106	Total	C	N	O	S	0	0
			886	551	149	183	3		

There are 42 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	-6	SER	-	expression tag	UNP Q9UPT6
B	-5	ASN	-	expression tag	UNP Q9UPT6
B	-4	ILE	-	expression tag	UNP Q9UPT6
B	-3	GLU	-	expression tag	UNP Q9UPT6
B	-2	PHE	-	expression tag	UNP Q9UPT6
B	-1	LEU	-	expression tag	UNP Q9UPT6
B	0	LYS	-	expression tag	UNP Q9UPT6
B	561	GLY	-	expression tag	UNP Q9UPT6
B	562	SER	-	expression tag	UNP Q9UPT6
B	563	GLY	-	expression tag	UNP Q9UPT6
B	564	SER	-	expression tag	UNP Q9UPT6
B	565	GLY	-	expression tag	UNP Q9UPT6
B	566	ARG	-	expression tag	UNP Q9UPT6
B	567	TRP	-	expression tag	UNP Q9UPT6
B	568	SER	-	expression tag	UNP Q9UPT6
B	569	HIS	-	expression tag	UNP Q9UPT6
B	570	PRO	-	expression tag	UNP Q9UPT6
B	571	GLN	-	expression tag	UNP Q9UPT6
B	572	PHE	-	expression tag	UNP Q9UPT6
B	573	GLU	-	expression tag	UNP Q9UPT6
B	574	LYS	-	expression tag	UNP Q9UPT6
C	-6	SER	-	expression tag	UNP Q9UPT6
C	-5	ASN	-	expression tag	UNP Q9UPT6
C	-4	ILE	-	expression tag	UNP Q9UPT6
C	-3	GLU	-	expression tag	UNP Q9UPT6
C	-2	PHE	-	expression tag	UNP Q9UPT6

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-1	LEU	-	expression tag	UNP Q9UPT6
C	0	LYS	-	expression tag	UNP Q9UPT6
C	561	GLY	-	expression tag	UNP Q9UPT6
C	562	SER	-	expression tag	UNP Q9UPT6
C	563	GLY	-	expression tag	UNP Q9UPT6
C	564	SER	-	expression tag	UNP Q9UPT6
C	565	GLY	-	expression tag	UNP Q9UPT6
C	566	ARG	-	expression tag	UNP Q9UPT6
C	567	TRP	-	expression tag	UNP Q9UPT6
C	568	SER	-	expression tag	UNP Q9UPT6
C	569	HIS	-	expression tag	UNP Q9UPT6
C	570	PRO	-	expression tag	UNP Q9UPT6
C	571	GLN	-	expression tag	UNP Q9UPT6
C	572	PHE	-	expression tag	UNP Q9UPT6
C	573	GLU	-	expression tag	UNP Q9UPT6
C	574	LYS	-	expression tag	UNP Q9UPT6

- Molecule 2 is a protein called Cytoplasmic dynein 1 heavy chain 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	f	420	Total	C	N	O	S	0	0
			3449	2195	616	626	12		
2	m	523	Total	C	N	O	S	0	0
			4321	2746	784	778	13		

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
f	1567	GLU	ARG	engineered mutation	UNP Q14204
f	1610	GLU	LYS	engineered mutation	UNP Q14204
m	1567	GLU	ARG	engineered mutation	UNP Q14204
m	1610	GLU	LYS	engineered mutation	UNP Q14204

- Molecule 3 is a protein called Cytoplasmic dynein 1 intermediate chain 2.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	h	371	Total	C	N	O	S	0	0
			2897	1820	508	554	15		
3	o	371	Total	C	N	O	S	0	0
			2897	1820	508	554	15		

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
h	484	SER	THR	conflict	UNP Q13409
h	499	GLY	ASP	conflict	UNP Q13409
o	484	SER	THR	conflict	UNP Q13409
o	499	GLY	ASP	conflict	UNP Q13409

- Molecule 4 is a protein called Cytoplasmic dynein 1 light intermediate chain 2.

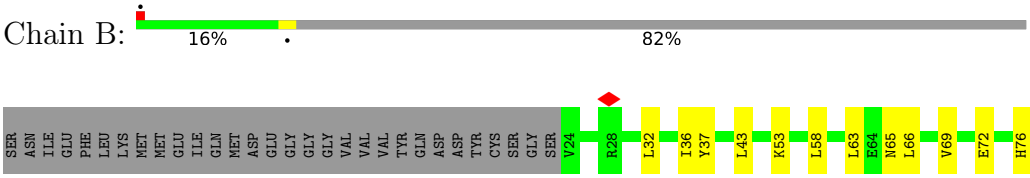
Mol	Chain	Residues	Atoms					AltConf	Trace
4	j	299	Total	C	N	O	S	0	0
			2428	1561	407	449	11		
4	E	13	Total	C	N	O		0	0
			65	39	13	13			
4	F	13	Total	C	N	O		0	0
			65	39	13	13			

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.

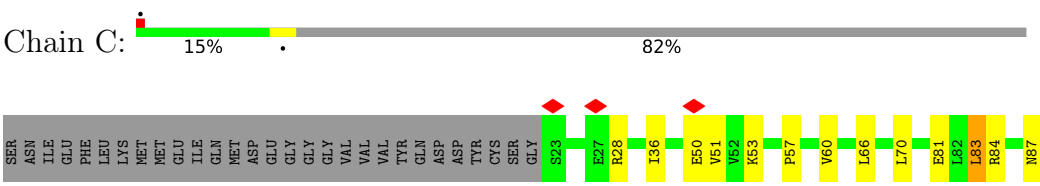
• Molecule 1: C-Jun-amino-terminal kinase-interacting protein 3

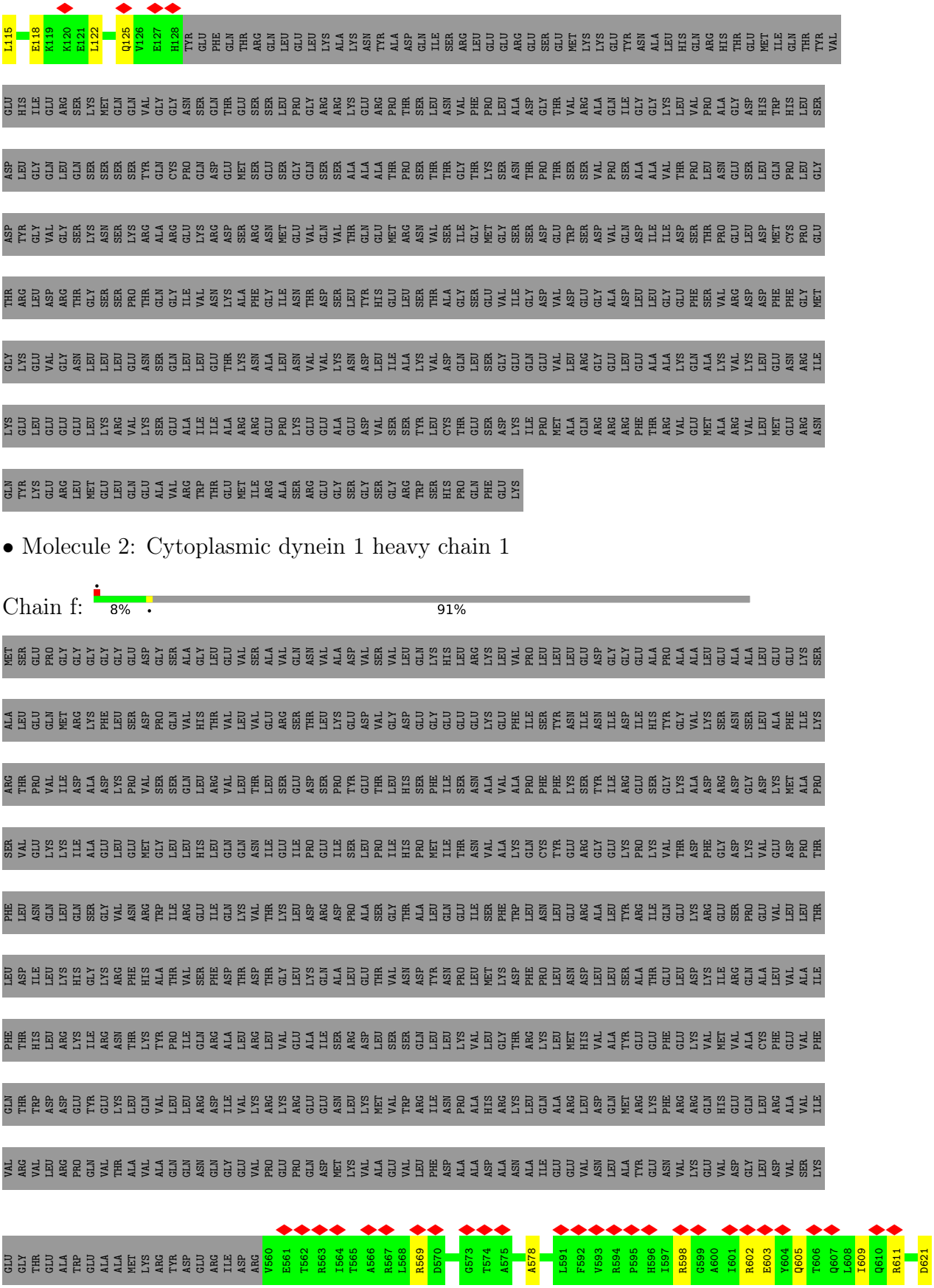
Chain B:



• Molecule 1: C-Jun-amino-terminal kinase-interacting protein 3

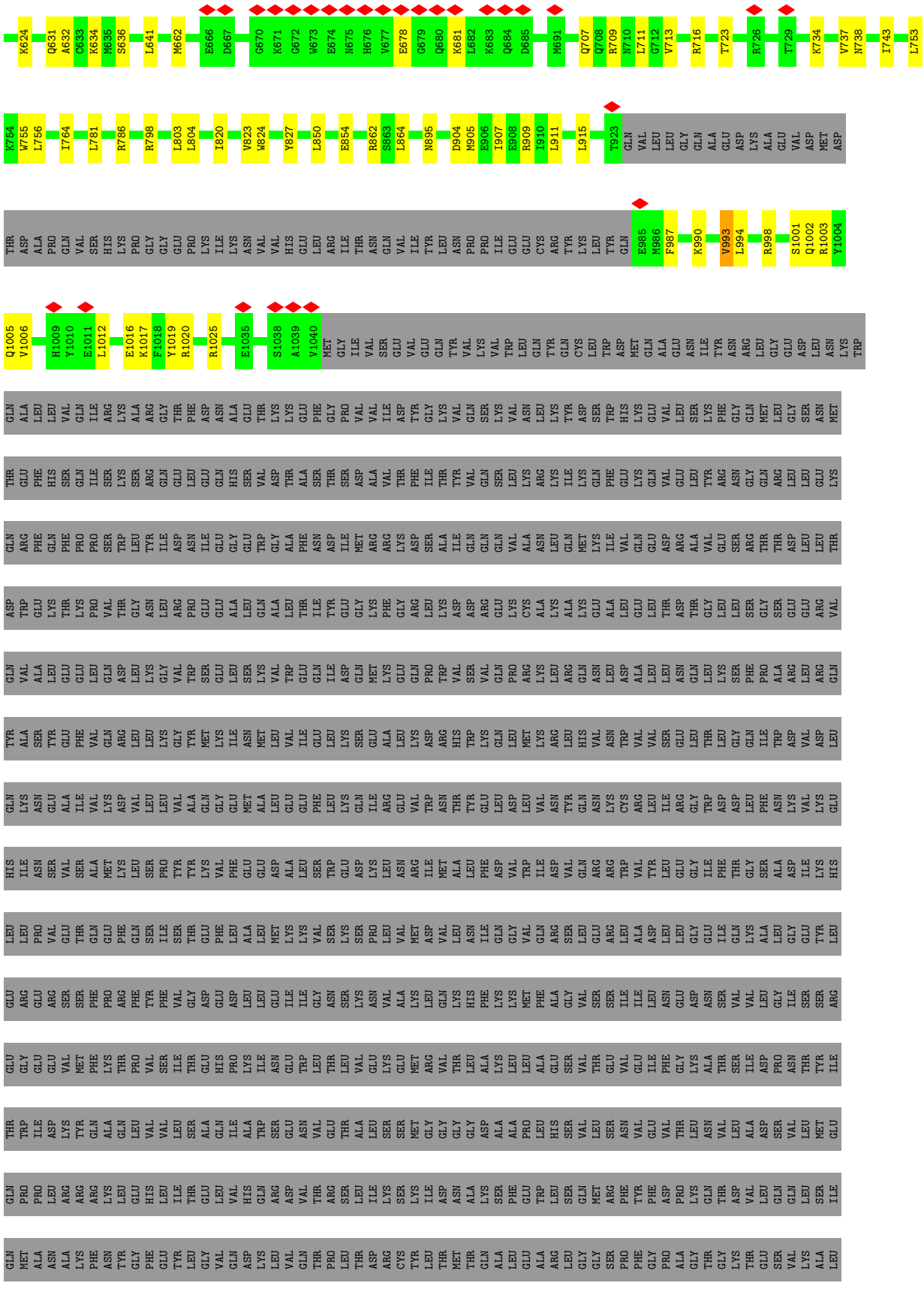
Chain C:

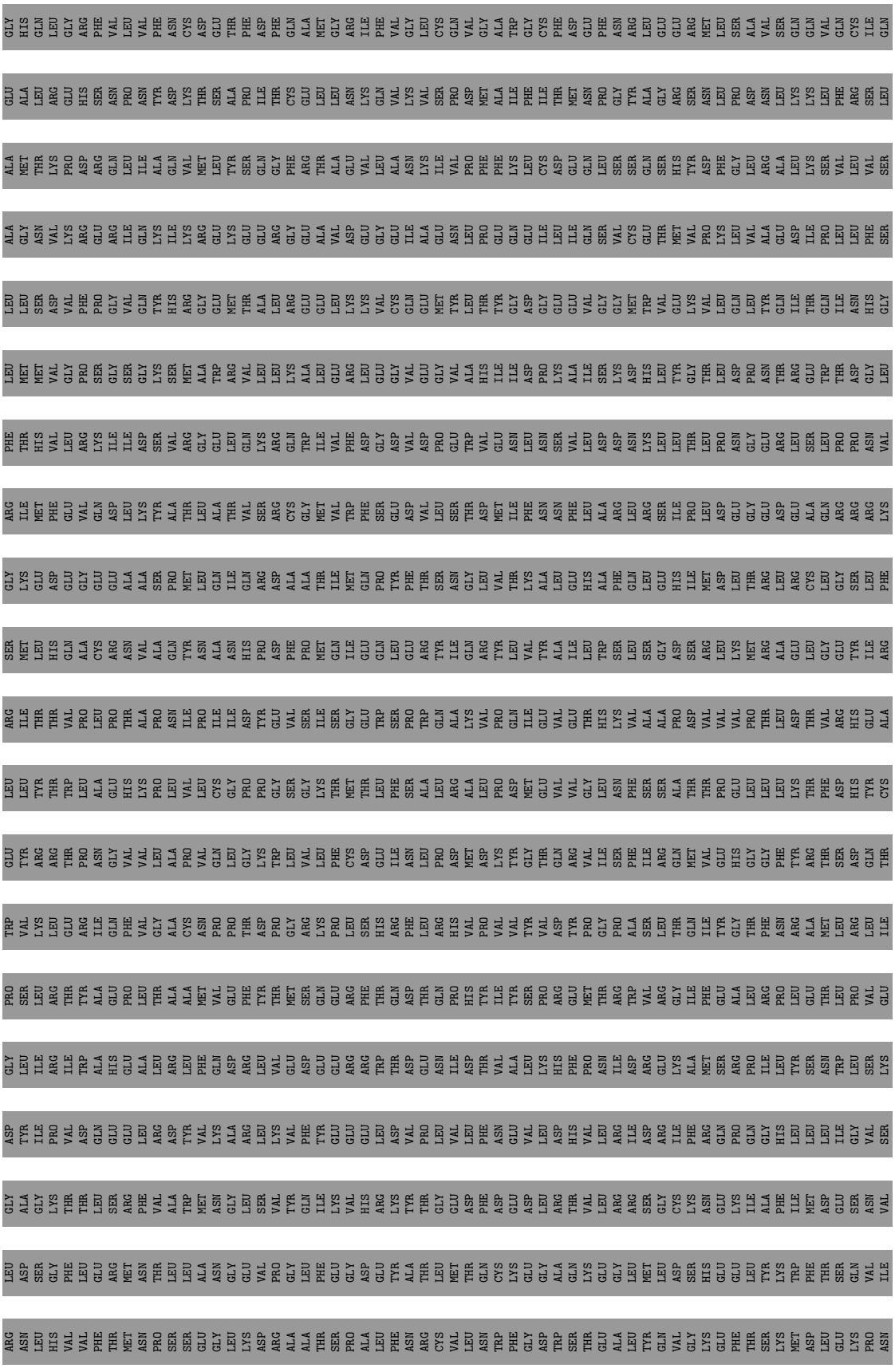


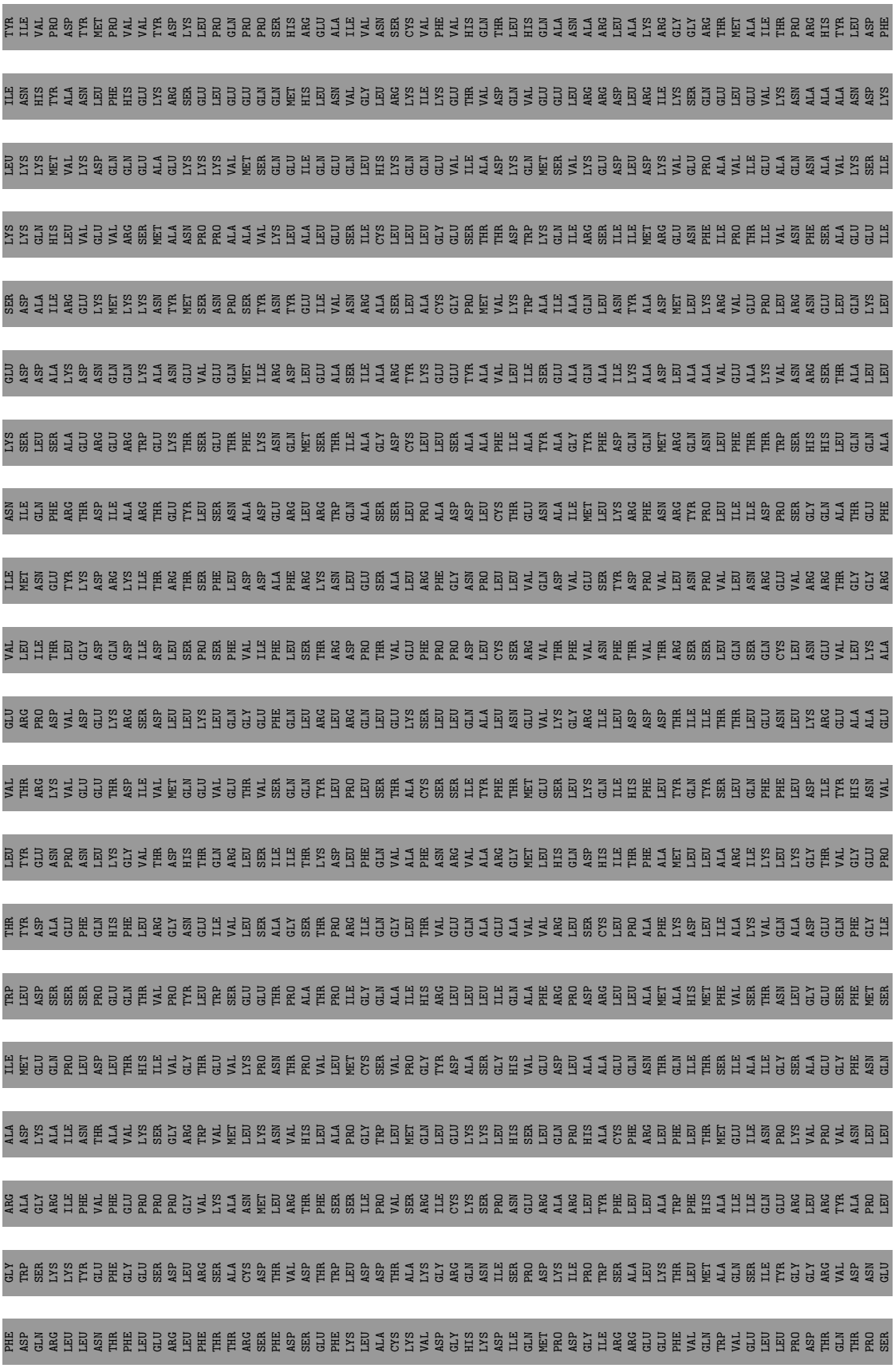


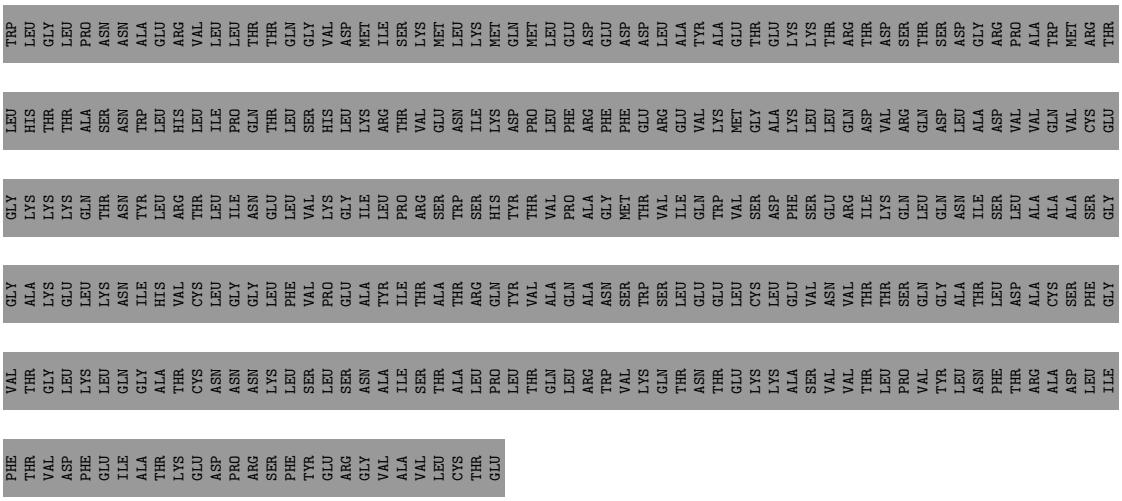
• Molecule 2: Cytoplasmic dynein 1 heavy chain 1

Chain f:


K624 Q631 A632 C633 K634 M635 S636 L641 M662 E666 D667 G670 K671 G672 W673 E674 N675 H676 V677 E678 G679 Q680 K681 L682 K683 Q684 D685 M691 Q707 Q708 R709 N710 L711 G712 V713 R716 T723 R726 T729 K734 V737 N738 I743 L753
K754 W755 L756 I764 L781 R786 R798 L803 L804 I820 V823 W824 Y827 L850 E854 R862 S863 L864 N895 D904 M905 E906 T907 E908 R909 I910 L911 L915 T923 GLN VAL LEU LEU GLY GLN ALA GLU ASP LYS ALA GLU VAL ASP MET ASP
THR ASP ALA PRO GLN VAL SER HIS LYS PRO GLY GLY GLU PRO LYS ILE LYS ASN VAL VAL HIS GLU LEU ARG ILE THR ASN GLN VAL ILE TYR LEU ASN PRO PRO ILE GLU GLU CYS ARG TYR LYS LEU TYR GLN E985 M986 F987 K990 V993 L994 R998 S1001 Q1002 R1003 Y1004
Q1005 V1006 H1009 Y1010 E1011 L1012 E1016 K1017 F1018 Y1019 R1020 R1025 E1035 S1038 A1039 V1040 MET GLY ILE VAL SER GLU VAL GLU GLN TYR VAL LYS VAL TRP LEU GLN TYR GLN CYS LEU TRP ASP MET GLN ALA GLU ASN ILE TYR ASN ARG GLY GLU ASP LEU ASN LYS TRP
GLN ALA LEU LEU VAL GLN ILE ARG LYS ALA ARG GLY THR PHE ASP ASN ALA GLU THR LYS LYS GLU PHE GLY PRO VAL VAL ILE ASP TYR GLY LYS VAL GLN SER LYS VAL ASN LEU LYS TYR ASP SER TRP HIS LYS GLU VAL LEU SER LYS PHE GLY GLN MET LEU GLY SER ASN MET
THR GLU PHE HIS SER GLN ILE SER LYS SER ARG GLN GLU LEU GLU GLN HIS SER VAL ASP THR ALA SER THR SER ASP ALA VAL THR PHE ILE THR TYR VAL GLN GLN SER LEU LYS ARG LYS ILE LYS GLN PHE GLU LYS GLN VAL GLU LEU TYR ARG ASN GLY GLN ARG LEU LEU GLU LYS
GLN ARG PHE GLN PHE PRO PRO SER TRP LEU TYR ILE ASP ASN ILE GLU GLY GLY ALA PHE ASN ASP ILE MET ARG ARG LYS ASP SER ALA ILE GLN GLN GLN VAL ALA ASN LEU GLN MET LYS ILE VAL GLN GLU ASP ARG GLU VAL LEU GLU LEU THR
ASP TRP GLU LYS THR LYS PRO VAL THR GLY ASN LEU ARG PRO GLU GLU ALA LEU GLN LEU ALA LEU THR ILE TYR GLU GLY LYS PHE GLY ARG LEU LYS ASP ASP ARG GLU LYS CYS ALA LYS ALA LYS GLU ALA LEU GLU GLU LEU THR ASP THR GLY LEU LEU SER GLY SER GLU GLU ARG VAL
GLN VAL ALA LEU GLU GLN LEU LYS GLY VAL TRP SER GLU LEU SER LYS VAL TRP GLU GLN ILE ASP GLN MET LYS GLU GLN PRO TRP VAL SER VAL GLN PRO ARG LYS LEU ARG GLN ASN LEU ASP ALA LEU LEU LEU ASN GLN LEU LYS SER PHE PRO ALA ARG LEU ARG GLN
TYR ALA SER TYR GLU PHE VAL GLN ARG LEU LEU LYS GLY TYR MET LYS ILE ASN MET LEU VAL ILE GLU LEU LYS SER GLU GLU ALA LEU LEU LYS ASP ARG HIS TRP LYS GLN LEU MET LYS ARG LEU HIS VAL ASN TRP VAL VAL SER GLU LEU THR ASP GLY GLN ILE TRP ASP VAL ASP LEU
GLN LYS ASN GLU ALA ILE VAL LYS ASP VAL LEU LEU LEU LYS VAL ALA GLN GLY GLU MET ALA LEU GLU GLU PHE LEU LYS GLN ILE ARG GLU VAL TRP ASN THR TYR GLU LEU ASP LEU VAL ASN TYR GLN ASN LYS CYS ARG LEU ILE ARG GLY TRP ASP ASP LEU PHE ASN LYS VAL LYS GLU
HIS ILE ASN SER VAL SER ALA MET LYS LEU SER PRO TYR TYR LYS VAL PHE GLU GLU ASP ALA LEU SER TRP GLU ASP LYS LEU ASN ARG ILE MET ALA ILE LEU PHE ASP VAL TRP ILE ASP VAL GLN ARG ARG TRP VAL TYR LEU GLU GLY ILE PHE THR GLY LYS HIS
LEU LEU PRO VAL GLU THR GLN GLU PHE GLN SER ILE SER THR GLU PHE LEU ALA LEU MET LYS LYS VAL SER LYS SER SER PRO LEU VAL MET ASP VAL LEU ASN ILE GLN GLY VAL GLN ARG SER LEU GLU ARG LEU ALA ASP LEU LEU GLY GLU ILE GLN LYS ALA LEU GLY GLU TYR LEU
GLU ARG GLU ARG SER SER PHE PRO ARG PHE TYR PHE VAL GLY ASP GLU ASP LEU LEU GLU ILE ILE GLY ASN SER LYS ASN VAL ALA LYS LEU GLN LYS HIS PHE LYS LYS MET PHE ALA GLY VAL SER SER ILE ILE LEU ASN GLU ASP ASN SER VAL VAL LEU GLY ILE SER SER ARG
GLU GLY GLU GLU VAL MET PHE LYS THR PRO VAL SER ILE THR GLU HIS PRO LYS ILE ASN GLU TRP LEU THR LEU VAL VAL SER LYS GLU MET ARG VAL THR LEU ALA LYS LEU LEU LEU ALA ASP PRO ASN THR TYR ILE
THR TRP ILE ASP LYS TYR GLN ALA GLN LEU VAL VAL LEU SER ILE THR GLU ALA GLN ILE ALA TRP SER GLU ASN VAL GLU THR ALA LEU SER SER MET GLY GLY GLY GLY ASP ALA ALA PRO LEU HIS SER VAL LEU SER ASN VAL GLU VAL THR LEU ASP PRO LEU LEU ASN VAL VAL ILE
GLN PRO PRO LEU ARG ARG ARG ARG LYS LEU GLU HIS LEU ILE THR GLU LEU VAL HIS GLN ARG ASP VAL THR ARG SER LEU ILE LYS SER LYS ILE ASP ASN ALA LYS SER PHE GLU TRP LEU SER GLN MET ARG PHE TYR PHE ASP PRO LYS LEU GLN GLN ILE SER VAL PRO LEU
GLN MET ALA ASN ALA LYS PHE TYR LEU GLU LEU THR ASP ARG CYS TYR LEU THR ALA GLN ILE ALA LEU GLY GLY SER PRO PHE GLY PRO ALA GLY THR LYS ILE GLU

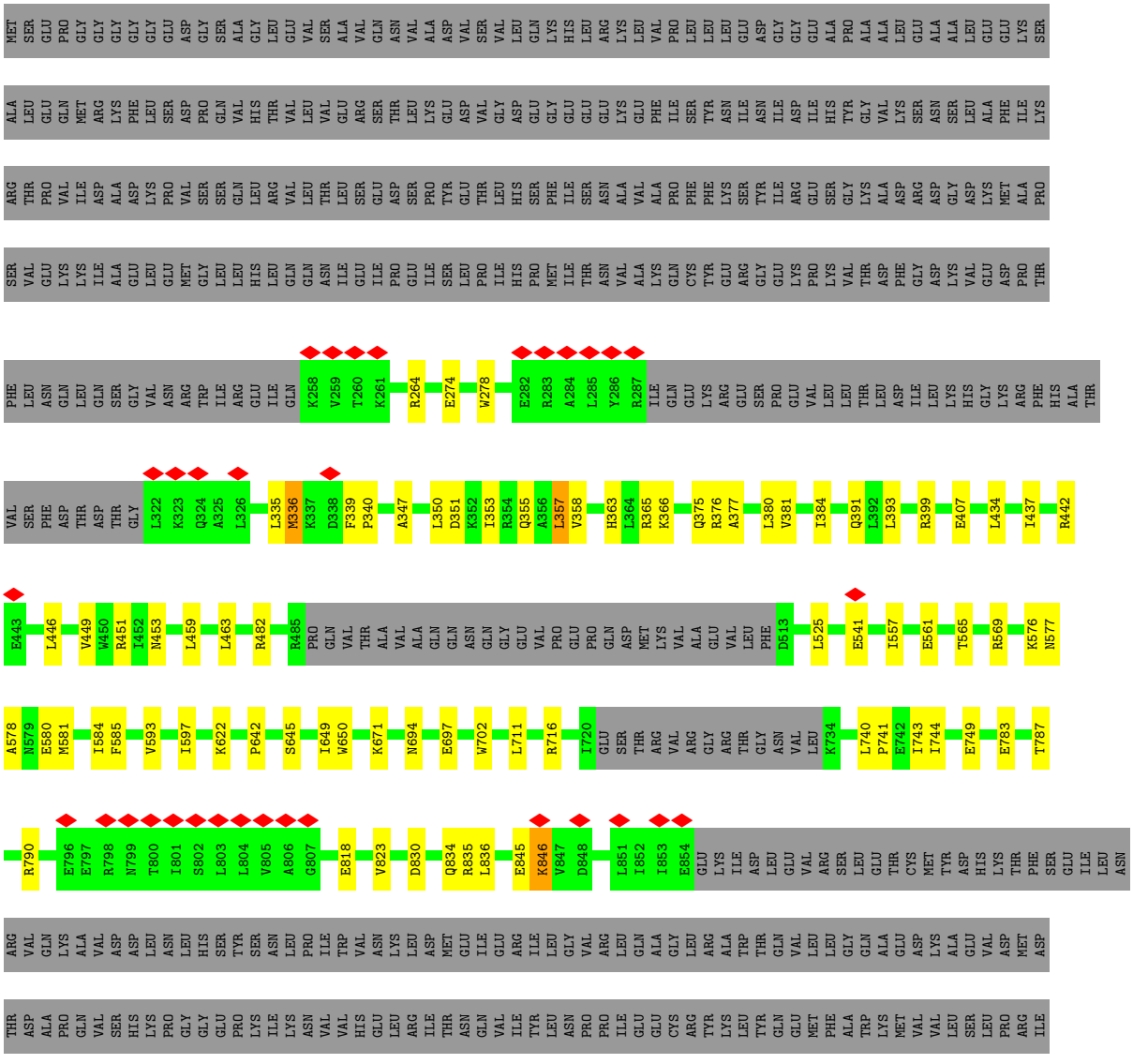

GLY HIS GLN LEU GLY ARG PHE VAL LEU VAL PHE ASN CYS ASP GLU THR PHE ASP PHE GLN ALA MET GLY ARG ILE PHE VAL GLY LEU CYS GLN VAL GLY ALA TRP GLY CYS PHE ASP GLU PHE ASN ARG LEU GLU GLU ARG MET LEU SER ALA VAL SER GLN GLN VAL GLN CYS ILE GLN
GLU ALA LEU ARG GLU HIS SER ASN PRO ASN TYR ASP LYS THR SER ALA PRO ILE THR CYS GLU LEU LEU ASN LYS GLN VAL LYS VAL SER PRO ASP MET ALA ILE PHE ILE THR MET ASN PRO GLY TYR ALA GLY ARG SER ASN LEU PRO ASP ASN LEU LYS LYS LEU PHE ARG SER LEU
ALA MET THR LYS PRO ASP ARG GLN LEU ILE ALA GLN VAL MET LEU TYR SER GLN GLY PHE ARG THR ALA GLU VAL LEU ALA ASN LYS ILE VAL PRO PHE PHE LYS LEU CYS ASP GLU GLN LEU SER SER GLN HIS TYR ASP PHE GLY LEU LEU ARG ALA LEU LYS SER VAL LEU VAL SER
ALA GLY ASN VAL LYS ARG GLU ILE GLN LYS ILE LYS ARG GLU LYS GLU GLU ARG GLY GLU ALA VAL ASP GLU GLY ARG GLN LEU GLU ILE ALA GLU GLU ASN GLU ASN LEU PRO GLU GLN GLU ILE LEU ILE GLN SER VAL CYS GLU THR MET VAL PRO LYS LEU LYS ASP ILE PRO LEU LEU PHE SER
LEU LEU SER ASP VAL PHE PRO GLY VAL GLN TYR HIS ARG GLY GLU MET THR ALA LEU ARG GLU CYS GLN GLU LEU LYS LYS VAL CYS GLN GLU MET TYR LEU THR TYR GLY ASP GLY GLU GLU VAL GLY SER MET TRP VAL GLU LYS VAL GLY THR LEU GLN PRO ASN THR ARG GLU GLU TRP THR GLN ILE ASP THR TYR GLY
LEU MET MET VAL GLY PRO SER GLY SER GLY LYS SER MET ALA TRP ARG VAL LEU LEU LYS ALA LEU GLU ARG GLU GLY VAL ALA HIS ILE ILE ASP PRO LYS ALA ILE SER LYS ASP HIS LEU TYR GLY THR LEU ASP PRO ASN THR ARG GLU TRP THR ASP GLY LEU
PHE THR HIS VAL LEU ARG LYS ILE ILE ASP SER VAL ARG GLY GLU LEU GLN LYS ARG GLN TRP ILE VAL PHE ASP GLY ASP VAL ASP PRO GLU TRP VAL GLU ASN LEU ASN SER VAL LEU LEU THR PRO ASN GLY GLU ARG LEU SER LEU PRO PRO ASN VAL
ARG ILE MET PHE GLU VAL GLN ASP LEU LYS TYR ALA THR LEU ALA THR VAL SER ARG CYS GLY MET VAL TRP PHE SER GLU ASP VAL LEU SER THR ASP MET ILE PHE ASN ASN PHE LEU ALA ARG LEU SER ILE PRO LEU ASP GLU GLY ASP GLU ALA GLN ARG ARG ARG LYS
GLY LYS GLU ASP GLU GLY GLU GLU ALA ALA SER PRO MET LEU GLN ILE GLN ARG ASP ALA ALA THR ILE MET GLN PRO TYR PHE THR SER ASN GLY LEU VAL THR LYS ALA LEU GLU HIS ALA PHE GLN LEU GLU HIS ILE MET ASP LEU THR ARG LEU ARG CYS LEU GLY SER LEU PHE
SER MET LEU HIS GLN ALA CYS ARG ASN VAL ALA GLN TYR ASN ALA ASN HIS PRO ASP PHE PRO MET GLN ILE GLU GLN ARG TYR ILE GLN ARG TYR LEU VAL TYR ALA ILE LEU TRP SER LEU SER GLY ASP SER ARG LEU LYS MET ARG ALA GLU LEU GLY GLU TYR ILE ARG
ARG ILE THR THR VAL PRO LEU PRO THR ALA PRO ASN ILE PRO ILE ILE ASP TYR GLU VAL SER ILE SER GLY GLU TRP SER PRO TRP GLN ALA LYS VAL ALA ALA PRO ASP SER VAL LEU ASP GLN ILE ILE LYS VAL GLU VAL GLU THR HIS LYS VAL ALA ALA PRO ASP VAL VAL PRO THR LEU LEU ASP THR VAL THR HIS GLU GLN LEU
LEU LEU TYR THR TRP LEU ALA GLU HIS LYS PRO LEU VAL LEU VAL LEU SER LYS THR MET THR LEU PHE SER ALA LEU ARG ALA LEU PRO ASP ASP MET GLU VAL VAL GLY LEU ASN PHE SER SER ALA THR THR PRO GLU LEU LEU LYS THR PHE ASP HIS TYR CYS
GLU TYR ARG ARG THR PRO ASN GLY VAL VAL LEU ALA PRO VAL GLN LEU GLY LYS TRP LEU VAL LEU PHE CYS ASP GLU ILE ASN LEU PRO ASP MET ASP VAL THR ILE ARG GLN ARG VAL ILE SER PHE ILE ARG GLN MET VAL GLU ILE TYR GLY THR GLY GLY PHE TYR ARG THR SER ASP GLN THR
TRP VAL LYS LEU GLU ARG ILE GLN PHE VAL GLY ALA CYS ASN PRO PRO THR ASP PRO GLY ARG LYS PRO LEU SER HIS ARG PHE LEU ARG HIS VAL PRO VAL VAL TYR VAL ASP TYR PRO GLY PRO ALA SER LEU THR GLN ILE TYR GLY THR PHE ASN ARG ALA MET LEU LEU ARG LEU ILE
PRO SER LEU ARG THR THR TYR ALA GLU PRO ALA GLU PHE TYR THR MET SER GLN GLU ARG PHE THR GLN ASP THR GLN PRO HIS TYR ILE TYR SER PRO ARG GLU MET THR ARG TRP VAL ARG GLY LEU PHE GLU ALA LEU ARG PRO LEU GLU THR LEU PRO VAL
GLY LEU ILE ARG ILE TRP ALA ALA LEU GLU ASP GLU ASN ILE ASP THR VAL ALA LEU LYS HIS PHE PRO ASN ILE ASP ARG GLU LYS ALA MET SER ARG TRP ILE ASP ARG ILE PHE ARG PRO ILE LEU TYR SER ASN TRP LEU SER LYS
ASP TYR ILE PRO VAL ASP GLN GLU GLU LEU ARG ARG GLU LEU ASP VAL PRO LEU VAL LEU PHE ASN GLU ILE ASP THR LEU LEU ARG ILE ASP HIS VAL LEU ARG ILE ASP ARG ILE PHE ARG GLN PRO GLN GLY HIS LEU LEU LEU ILE ASP GLU LEU SER VAL
GLY ALA GLY LYS THR THR THR LEU SER ARG PHE VAL ALA TRP MET ASN GLY LEU SER VAL TYR GLN ILE LYS VAL HIS ARG LYS TYR THR GLY GLU ASP PHE ASP GLU GLU ASP LEU ARG THR VAL LEU ARG ARG SER GLY CYS LYS ASN GLU LYS ILE ALA PHE ILE MET ASP GLU SER ASN VAL
LEU ASP SER GLY PHE LEU GLU ARG THR GLU VAL ASP ALA THR LEU MET THR LEU GLN CYS LYS GLU GLY ALA GLN LYS GLU GLY LEU MET LEU ASP SER HIS GLU GLU LEU GLN TYR LYS TRP PHE THR SER GLN VAL ILE
ARG ASN LEU HIS VAL VAL PHE THR MET ASN PRO SER SER GLU GLY VAL GLN TYR LEU PHE ASN ARG CYS VAL LEU ASN TRP PHE GLY ASP TRP SER THR GLU ALA LEU TYR GLN VAL GLY LYS GLU PHE THR SER LYS MET ASP LEU GLU LYS ASP ARG ALA ALA THR SER PRO ALA LEU PHE ASN ARG CYS VAL LEU ASN TRP PHE GLY ASP TRP SER THR GLU ALA LEU TYR GLN VAL GLY LYS GLU PHE THR SER LYS MET ASP LEU GLU LYS PRO ASN

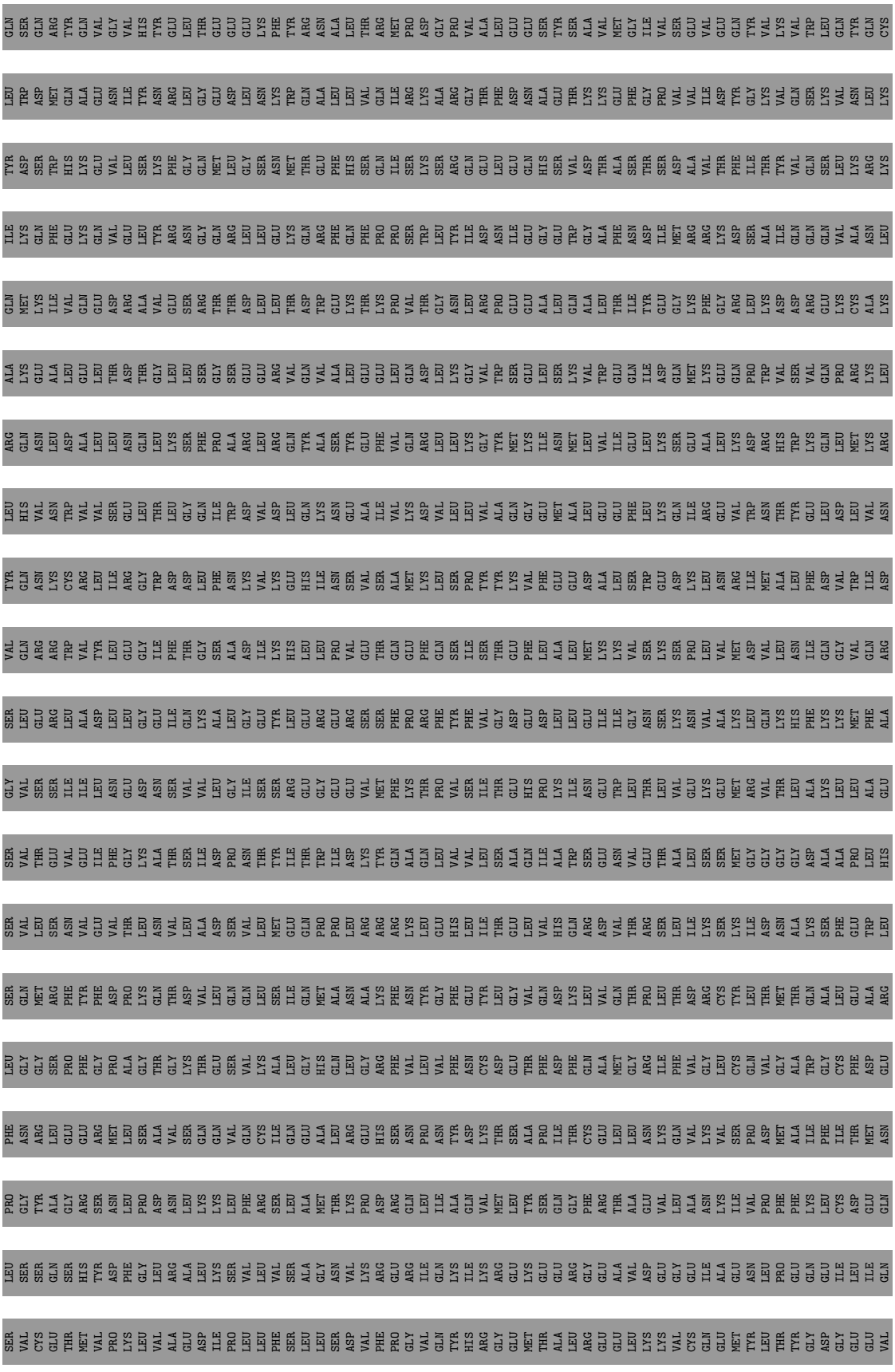

TYR ILE VAL PRO ASP TYR MET PRO VAL VAL TYR ASP LYS LEU PRO GLN PRO PRO SER HIS ARG GLU ALA ILE VAL ASN SER CYS VAL PHE VAL HIS GLN THR LEU HIS GLN ALA ASN ALA ARG LEU ALA LYS ARG GLY GLY ARG THR MET ALA ILE THR PRO ARG HIS TYR LEU ASP PHE
ILE ASN HIS TYR ALA ASN LEU PHE HIS GLU LYS ARG SER GLU LEU GLU GLU GLN GLN MET HIS LEU GLU ASN VAL GLY LEU ARG LYS ILE LYS GLU THR VAL ASP GLN VAL GLU GLU LEU ARG ARG ASP LEU ARG ILE LYS SER GLN GLU GLU VAL LYS ASN ALA ALA ASN ASP LYS
LEU LYS LYS MET VAL LYS ASP GLN GLN GLU ALA GLU LYS LYS LYS VAL MET SER GLN GLU ILE GLN GLU GLN GLN LEU HIS LYS GLN GLU VAL ILE ALA ASP LYS GLN MET SER VAL LYS GLU ASP LEU ASP LYS VAL GLU PRO ALA VAL ILE GLU ALA GLN ASN ALA VAL LYS SER ILE
LYS LYS GLN HIS LEU VAL GLU VAL ARG SER MET ALA ASN PRO PRO ALA ALA VAL LYS LEU ALA LEU GLU SER ILE CYS LEU LEU LEU GLY GLU SER THR THR ASP TRP LYS GLN ILE ARG GLU SER ILE ILE MET ARG GLU ASN PHE ILE PRO THR ILE VAL ASN PHE SER ASN GLU
SER ASP ALA ILE ARG GLU LYS MET LYS LYS ASN TYR MET SER ASN PRO SER TYR ASN TYR GLU ILE GLU VAL ASN ARG ALA SER LEU ALA CYS GLY PRO MET VAL LYS TRP ALA ILE ALA GLN LEU ASN TYR ALA ASP MET LEU LYS ARG VAL GLU GLU PRO LEU ARG ASN GLU LEU GLN LYS
GLU ASP ASP ALA LYS ASP ASN GLN GLN LYS ALA ASN GLU VAL GLU GLN MET ILE ARG ASP LEU GLU ALA SER ILE ALA ALA ARG GLY TYR LYS ALA ASP LEU ALA ALA VAL VAL GLU ASP ALA GLN LEU ILE SER GLU ALA GLN ALA ILE LYS ALA ASP LEU ALA ALA VAL GLU GLU LYS VAL ASN ARG SER THR LEU LEU
LYS SER LEU SER ALA GLU ARG GLU ARG TRP GLU LYS THR SER GLU THR PHE LYS ASN GLN MET SER THR ILE ALA GLY ASP CYS LEU LEU LEU SER ALA ALA PHE ILE ALA TYR ALA GLY TYR PHE ASP GLN GLN MET ARG GLN ASN LEU PHE THR THR TRP SER HIS HIS LEU GLN GLN ALA
ASN ILE GLN PHE ARG THR ASP ILE ALA ARG THR GLU TYR LEU SER ASN ALA ASP GLU ARG LEU ARG TRP GLN ALA SER SER LEU PRO ALA ASP ASP ASP LEU CYS THR GLU ASN ALA ILE MET LEU LYS ARG PHE ASN ARG GLN ASN LEU PHE ILE ILE ASP PRO SER GLY GLN ALA THR GLU PHE
ILE MET ASN GLU TYR LYS ASP ARG LYS ILE THR ARG THR SER PHE LEU ASP ALA ASP ALA PHE ARG LYS ASN LEU GLU SER ALA LEU ARG PHE GLY ASN PRO LEU LEU VAL GLN ASP VAL GLU SER TYR ASP PRO VAL LEU ASN PRO VAL LEU LEU ASN ARG GLU VAL ARG ARG THR GLY GLY ARG
VAL LEU ILE THR LEU GLY ASP GLN ASP ILE ASP LEU SER PRO SER PHE VAL ILE PHE LEU SER THR ARG ASP PRO THR VAL GLU PHE PRO PRO ASP LEU CYS SER ARG VAL THR PHE VAL ASN PHE THR VAL THR ARG SER SER LEU GLN LEU ASN GLU VAL LEU LYS ALA
GLU ARG PRO ASP VAL ASP GLU GLU LYS ARG SER ASP LEU LEU LYS LEU GLN GLY GLU PHE GLN LEU GLU LYS SER LEU LEU GLN ALA LEU ASP ASP ASP THR ILE ILE THR THR LEU GLN GLU GLU VAL LEU LYS ARG GLU
VAL THR ARG LYS VAL GLU GLU THR VAL SER GLN GLN TYR LEU PRO LEU SER THR ALA CYS SER SER ILE TYR HIS PHE GLN ILE HIS PHE LEU TYR GLN TYR SER LEU GLN GLN SER LEU GLN ASP ASN VAL
LEU TYR GLU ASN PRO ASN LEU LYS GLY VAL THR ASP HIS THR GLN ARG LEU SER ILE ILE THR LYS ASP LEU PHE GLN VAL GLY THR PHE ASN ARG VAL ALA ARG GLY MET LEU HIS GLN ASP HIS ILE THR PHE ALA MET LEU LEU LEU LYS GLY THR VAL GLY PRO
THR TYR ASP ALA GLU PHE LEU ARG GLY ASN GLU ILE VAL LEU SER ALA GLY SER THR PRO ARG ILE GLN GLY LEU THR VAL GLU GLN ALA GLU ALA VAL VAL ARG LEU SER CYS LEU PRO ALA PHE LYS ASP LEU ILE ALA ARG LYS VAL GLN GLN PHE GLY ILE
TRP LEU ASP SER SER SER PRO GLU GLN THR VAL PRO TYR LEU TRP SER GLU GLU THR PRO ALA THR PRO ILE GLY GLN ALA ILE HIS ARG LEU LEU LEU ILE GLN ALA PHE ARG PRO ASP ARG LEU LEU ALA MET ALA HIS MET PHE VAL LEU SER THR ASN LEU GLY GLU SER PHE MET SER
ILE MET GLU GLN PRO LEU LEU THR HIS THR VAL ASP ALA GLY TYR ASP ALA ALA GLU GLN SER ILE THR SER ILE ALA ILE ASN PRO LYS VAL PRO ALA GLU GLY GLN PHE GLY ILE
ALA ASP LYS ALA ILE ASN THR LYS ALA VAL PRO GLY TRP LEU MET GLN LEU GLU LYS LYS LEU HIS SER LEU GLN GLU HIS ALA CYS PHE ARG LEU PHE LEU THR MET GLU ILE ASN PRO LYS VAL PRO VAL ASN LEU LEU
ARG ALA GLY ARG ILE PHE VAL PRO PRO GLU VAL ARG THR PHE SER SER ILE PRO VAL SER ARG ILE CYS LYS SER PRO ASN GLU ARG ALA ARG LEU TYR PHE LEU ALA TRP PHE HIS ALA ILE ILE GLN GLU ARG LEU ARG TYR ALA PRO LEU
GLY TRP SER LYS LYS TYR GLU PHE GLY VAL ARG GLN ASN ILE SER PRO ASP LYS ILE PRO TRP SER ALA LEU LYS THR LEU MET LEU GLU SER LEU ASP ASP THR ALA ALA LEU ASP ASP ASP LEU ASP ASP
PHE ASP GLN ARG LEU PHE THR ARG SER PHE ASP SER GLU PHE LYS LEU ALA CYS LYS VAL ASP GLY HIS LYS ASP ILE GLN MET PRO ASP GLY ILE ARG ARG GLU GLU PHE VAL GLN TRP VAL GLU LEU LEU PRO GLY ILE ARG GLU VAL PRO THR GLN THR ASP

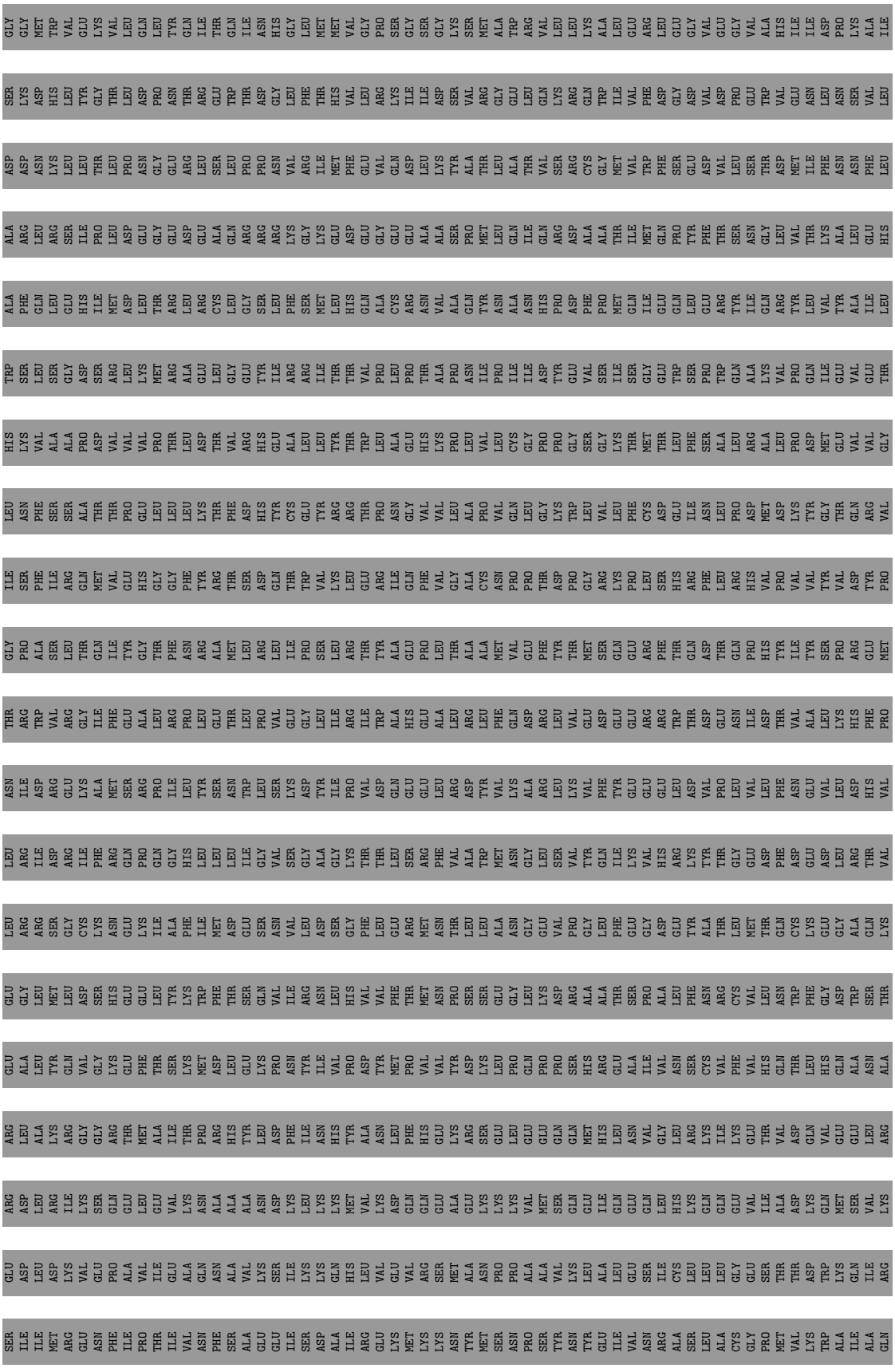


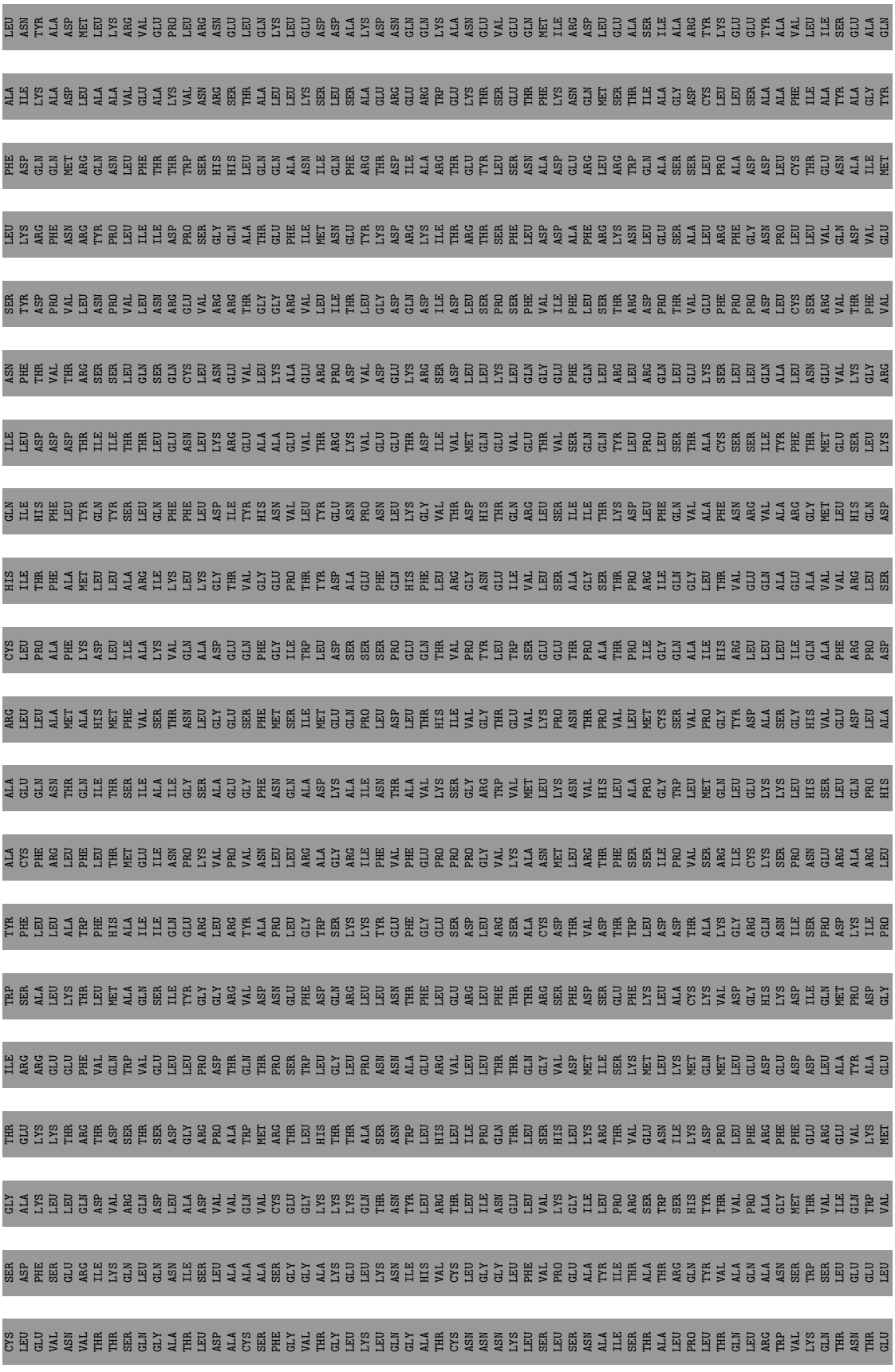
• Molecule 2: Cytoplasmic dynein 1 heavy chain 1

Chain m:

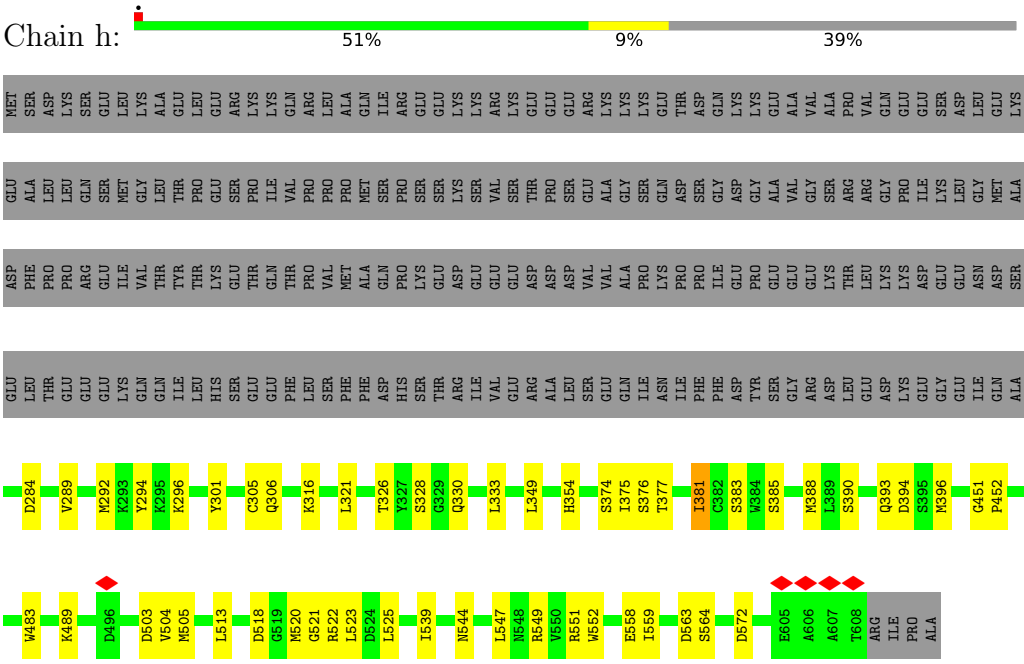



GLN SER GLN ARG TYR GLN VAL GLY VAL HIS TYR GLU LEU THR GLU GLU GLU LYS PHE TYR ARG ASN ALA LEU THR ARG MET PRO ASP GLY PRO VAL ALA LEU GLU GLU GLN TYR VAL LYS VAL TRP LEU GLN THR GLN CYS
LEU TRP ASP MET GLN ALA GLU ASN ILE TYR ASN ARG LEU GLY GLU ASP LEU ASN LYS TRP GLN ALA LEU LEU VAL GLN ILE ARG LYS ALA ARG GLY THR PHE ASP ASN ALA GLU THR LYS LYS GLU PHE GLY PRO VAL VAL ILE ASP TYR GLY LYS VAL GLN SER LYS VAL ASN LEU LYS
TYR ASP SER TRP HIS LYS GLU VAL LEU SER LYS PHE GLY GLN MET LEU GLY SER ASN MET THR GLU PHE HIS SER GLN ILE SER LYS SER ARG GLN GLU LEU GLU GLN HIS SER VAL ASP THR ALA SER THR SER ASP ALA VAL THR PHE ILE THR TYR VAL GLN SER LYS VAL LEU ARG LYS
ILE LYS GLN PHE GLU LYS GLN VAL GLU LEU TYR ARG ASN GLY GLN ARG LEU GLU LYS GLN ARG PHE GLN PHE PRO PRO SER TRP LEU TYR ILE ASP ASN ILE GLU GLY GLU TRP GLY ALA PHE ASN ASP ILE MET ARG ARG LYS ASP SER ALA ILE GLN GLN VAL ALA ASN LEU
GLN MET LYS ILE VAL GLN GLU ASP ARG ALA VAL THR ASP TRP GLU ALA LYS THR LYS PRO VAL THR GLY ASN LEU ARG LYS PRO GLU LEU TYR GLU GLY LYS PHE GLY ARG GLU GLU ASP ASP ARG GLU LYS CYS ALA LYS
ALA LYS GLU ALA LEU GLU LEU THR ASP THR GLY LEU LEU THR SER GLY GLU GLU ARG VAL GLN LYS GLU ALA LEU GLU GLU GLN LEU GLN ILE SER SER LYS VAL TRP GLU GLN ILE ASP GLN MET LYS GLU GLN PRO TRP VAL SER VAL GLN PRO GLU LYS VAL LEU
ARG GLN ASN LEU ASP ALA LEU LEU ASN GLN LEU LEU LYS SER PHE PRO ALA ARG LEU ARG GLN TYR ALA SER TYR GLU PHE VAL GLN ARG LEU LEU LYS GLY TYR MET LYS ILE ASN MET LEU VAL ILE GLU LEU LYS SER GLU ALA LEU LYS ASP GLU MET LYS VAL ARG
LEU HIS VAL ASN TRP VAL VAL SER GLU LEU THR LEU GLY GLN ILE TRP ASP VAL ASP LEU GLN LYS ASN GLU ALA ILE VAL LYS ASP VAL LEU LEU VAL ALA GLN GLY GLU MET ALA LEU GLU GLU PHE LEU LYS SER GLN ILE ARG GLU VAL LEU LEU ARG GLN ASP ILE ASN
TYR GLN ASN LYS CYS ARG LEU ILE ARG GLY TRP ASP ASP LEU PHE ASN LYS VAL LYS GLU HIS ILE ASN SER VAL SER ALA MET LYS LEU SER PRO TYR TYR LYS VAL PHE GLU GLU ASP ALA LEU SER TRP GLU ASP LYS LEU ASN ARG ILE MET ALA LEU PHE ASP VAL TRP ILE ASP
VAL GLN ARG ARG TRP VAL TYR LEU GLU GLY GLY ILE PHE THR GLY SER ALA ASP ILE LYS HIS LEU LEU PRO VAL GLU THR GLN GLU PHE GLN SER ILE SER THR GLU GLU PHE LEU ALA LEU MET LYS LYS VAL SER LYS SER PRO LEU VAL MET ASP VAL LEU ASN ILE GLN GLY VAL GLN ARG
SER LEU GLU ARG LEU ALA ASP LEU LEU GLY LYS ALA LEU GLY GLU TYR LEU GLU ARG GLU ARG GLU ARG GLY PHE PRO PHE PRO ARG PHE TYR PHE VAL GLY ASP GLU LEU GLU ILE ILE GLY ASN SER LYS ASN VAL ALA LYS LEU GLU LEU LEU ASP ILE ASP
GLY VAL SER SER ILE ILE LEU GLU ASP GLU GLU VAL MET PHE LYS THR PRO VAL SER ILE THR GLU HIS PRO LYS ILE ASN GLU TRP LEU THR LEU VAL GLU LYS GLU MET GLY SER GLU GLU ASN VAL GLU THR ALA LEU SER SER MET ARG VAL THR LEU LEU GLY GLY GLY GLY ASP ALA ALA PRO LEU HIS
SER VAL THR GLU VAL GLU ILE PHE GLY LYS ALA THR SER ILE ASP PRO ASN THR TYR ILE ASP LYS TYR GLN ALA GLN LEU VAL VAL LEU GLU HIS LEU ILE THR GLU GLU LEU VAL HIS GLN ARG ASP VAL THR ARG SER LEU ILE LYS SER LYS ILE ASP ASN ALA LYS SER PHE GLU TRP LEU
SER VAL LEU SER ASN VAL GLU VAL THR LEU ASN VAL LEU ALA ASP SER VAL LEU MET ILE GLU GLN LEU PRO PRO LEU ARG ARG ARG LYS LEU GLU GLU HIS LEU ILE THR GLU GLU LEU VAL HIS GLN ARG ASP VAL THR ARG SER LEU ILE LYS SER SER MET ILE ASP ASN ALA LYS SER PHE GLU TRP LEU
SER GLN MET ARG PHE TYR PHE ASP PRO LYS GLN THR ASP VAL LEU LEU GLN GLN LEU LEU SER ILE MET ALA ASN GLY PHE GLU TYR LEU GLY VAL GLN ASP LYS PHE ASN TYR GLY PHE GLU SER ILE GLU LEU VAL GLN THR PRO LEU THR ASP ARG CYS TYR LEU THR MET THR GLN ALA LEU
LEU GLY GLY SER PRO PHE GLY PRO ALA GLY THR GLY LYS THR GLU SER VAL LYS ALA LEU GLN LEU GLY ARG PHE VAL LEU LEU VAL PHE ASN CYS ASP GLU THR PHE ASP PHE GLN ALA MET GLY ARG ILE PHE VAL GLY LEU CYS GLN VAL GLY ALA TRP GLY CYS PHE ASP GLU
PHE ASN ARG LEU GLU SER ALA VAL SER GLN GLN VAL GLN CYS ILE GLN GLU ALA LEU ARG GLU HIS SER ASN PRO ASN TYR ASP LYS THR CYS GLU LEU LEU ASN LYS GLN VAL LYS VAL SER PRO ASP MET ALA ILE PHE THR THR MET ASN
PRO GLY TYR ALA GLY ARG SER ASP LEU PRO ASP ASN LEU LYS LYS LEU PHE ARG SER LEU ALA MET THR LYS PRO ASP ARG GLN LEU ILE ALA GLN VAL MET LEU TYR SER GLN GLY PHE ARG THR ALA GLU VAL LEU ALA ASN LYS ILE VAL PRO PHE PHE LYS LEU CYS ASP GLU GLN
LEU SER SER GLN SER ASN LEU ARG GLY LEU ARG ASP ASN LEU LYS VAL LEU VAL SER ALA GLY ARG GLU ILE LYS ARG GLU LYS GLY GLU GLU ARG GLY GLU ALA VAL ASP GLU GLY GLU ILE ALA GLU GLN GLN ILE ILE LEU GLU ILE GLN
SER VAL CYS GLU THR MET VAL PRO LYS LEU VAL ALA GLU ASP ILE PRO LEU LEU PHE SER LEU LEU SER ASP VAL PHE PRO GLY VAL GLN TYR HIS ARG GLY GLU MET THR ALA LEU ARG GLU GLU LEU LYS LYS VAL CYS GLN GLU MET TYR LEU THR TYR GLY ASP GLY GLU GLU VAL

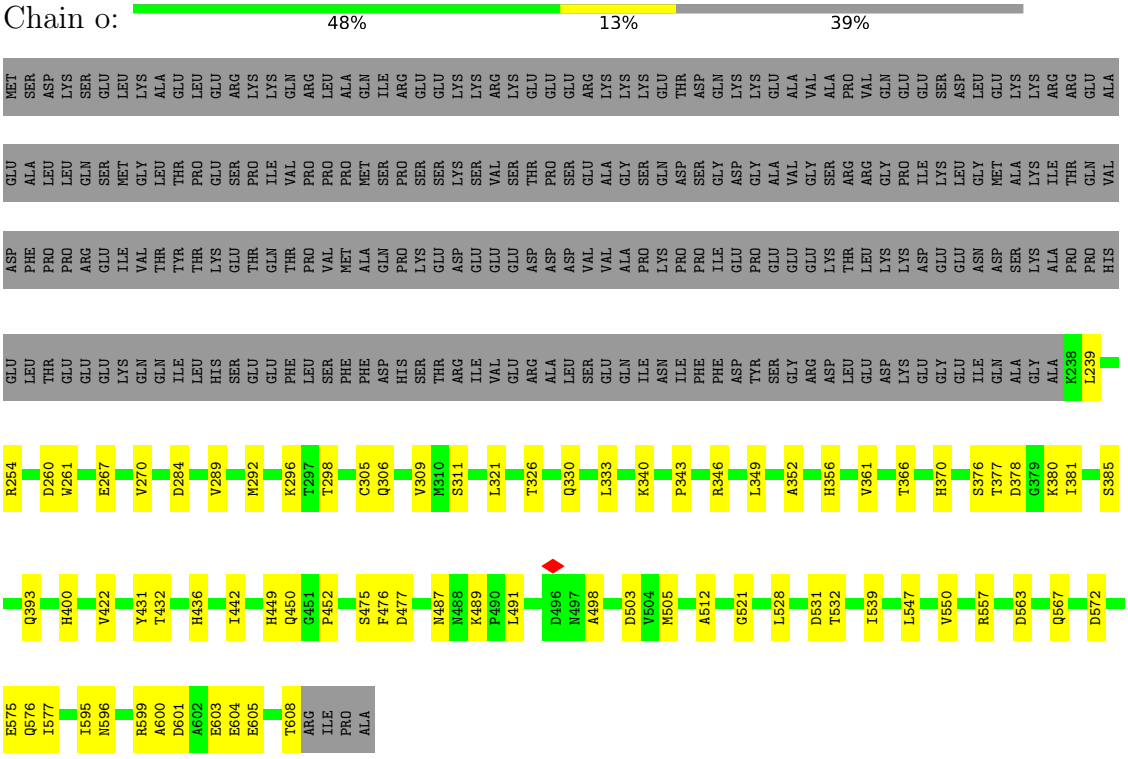

GLY GLY MET TRP VAL GLU LYS VAL LEU GLN LEU TYR GLN ILE THR GLN ILE ASN HIS GLY LEU MET MET VAL GLY PRO SER GLY GLY LYS SER MET ALA TRP ARG VAL LEU LEU LYS ALA LEU GLU ARG LEU GLU GLY VAL GLU GLY VAL ALA HIS ILE ILE ASP PRO LYS ALA ILE
SER LYS ASP HIS LEU TYR GLY THR LEU ASP PRO ASN THR ARG GLU TRP THR ASP GLY LEU PHE THR HIS VAL LEU ARG LYS ILE ASP SER VAL ARG GLY GLU LEU GLN LYS ARG GLN TRP ILE VAL PHE ASP GLY ASP VAL ASP PRO GLU TRP VAL GLU ASN LEU ASN SER VAL LEU
ASP ASP ASN LYS LEU LEU THR LEU PRO ASN GLY GLU ARG LEU SER LEU PRO PRO ASN VAL ARG ILE MET PHE GLU VAL GLN ASP LEU LYS TYR ALA THR LEU GLN ALA THR VAL SER ARG CYS GLY MET VAL TRP PHE SER GLU ASP VAL LEU SER ASN LEU PRO ASN PHE LEU
ALA ARG LEU ARG SER ILE PRO LEU ASP GLU GLY GLU ARG LEU GLU ASP GLU ALA GLN ARG ARG ARG LYS GLY LYS GLU ASP GLU GLY GLU GLU ALA ALA SER PRO MET LEU GLN ILE GLN ARG ASP ALA ALA THR ILE MET GLN PRO TYR PHE THR SER ASN CYS LEU GLU ALA GLN HIS
ALA PHE GLN LEU GLU HIS ILE MET ASP LEU THR ARG LEU ARG CYS ARG ASN VAL ALA PRO ASP PHE PRO MET GLN ILE GLU GLN LEU GLU ARG TYR ILE GLN ARG TYR LEU VAL ALA ILE LEU
TRP SER LEU SER GLY ASP SER ARG LEU LYS MET ARG ALA GLU LEU GLY GLU TYR ILE ARG ARG ILE THR THR VAL PRO LEU PRO THR ALA PRO ASN ILE PRO ILE ASP TYR GLU VAL SER ILE SER GLY GLU TRP SER PRO TRP GLN ALA LYS VAL PRO GLN ILE GLU VAL GLU THR
HIS LYS VAL ALA ALA PRO ASP VAL VAL VAL PRO THR LEU ASP THR VAL ARG HIS GLU ALA LEU LEU TYR THR TRP LEU ALA GLU HIS LYS PRO LEU VAL CYS GLY PRO PRO GLY SER GLY LYS THR MET THR LEU PHE SER ALA LEU ARG PRO ASP MET GLU VAL VAL GLY
LEU ASN PHE SER SER ALA THR THR PRO GLU LEU LEU LYS THR PHE ASP HIS TYR CYS GLU TYR ARG ARG THR PRO ASN GLY VAL VAL LEU ALA PRO VAL GLN LEU GLY LYS TRP LEU VAL LEU PHE CYS ASP GLU ILE ASN LEU PRO GLY SER PRO MET ASP LYS TYR GLY THR GLN ARG VAL
ILE SER PHE ILE ARG GLN MET VAL GLU HIS GLY GLY PHE TYR ARG THR SER ASP GLN THR THR TRP VAL LYS LEU GLU ARG ILE GLN PHE VAL GLY ALA CYS ASN PRO PRO THR ASP PRO GLY ARG LYS PRO LEU SER HIS ARG PHE LEU ARG HIS VAL PRO VAL PRO VAL TYR VAL ASP TYR PRO
GLY PRO ALA SER LEU THR GLN ILE TYR GLY THR PHE ASN ARG ALA MET LEU ARG LEU ILE PRO SER LEU ARG THR TYR ALA GLU PRO LEU THR ALA ALA MET VAL GLU PHE TYR THR MET SER GLN GLU ARG PHE THR GLN ASP THR GLN PRO HIS TYR ILE TYR SER PRO ARG GLU MET
THR ARG TRP VAL ARG GLY ILE PHE GLU ALA LEU ARG PRO LEU GLU THR ILE ARG ILE TRP ALA HIS GLU GLU ALA LEU ARG ASP ARG LEU VAL GLU ASP GLU GLU ARG ARG TRP THR ASP THR GLN ASP VAL PRO LEU VAL ALA LEU LYS HIS PHE PRO
ASN ILE ASP ARG GLU LYS ALA MET SER ARG PRO ILE LEU TYR SER ASN TRP LEU SER LYS ASP TYR ILE PRO VAL ASP GLN GLU GLU LEU ARG ASP TYR LEU VAL ASP LEU GLU GLU ASP VAL PRO LEU VAL LEU LEU ASP HIS VAL
LEU ARG ILE ASP ARG ILE PHE ARG GLN PRO GLN GLY HIS LEU LEU LEU ILE GLY VAL SER GLY ALA GLY LYS THR THR LEU SER ARG PHE VAL ALA TRP MET ASN GLY LEU SER VAL TYR GLN ILE LYS VAL HIS ARG LYS TYR THR GLY GLU GLU ASP PHE PHE ASP GLU ASP LEU ARG THR VAL
LEU ARG ARG SER GLY CYS LYS ASN GLU LYS LEU GLU ARG MET ASN THR LEU LEU ALA ASN GLY GLU VAL PRO GLY LEU PHE GLU GLY ASP GLU TYR ALA THR LEU GLY LYS GLU ASP ASP GLN CYS LYS GLU GLY GLY ALA GLN LYS
GLU GLY LEU MET LEU ASP HIS GLU GLU LEU TYR LYS TRP PHE THR SER GLN VAL ILE ARG ASN LEU HIS VAL ALA PHE THR MET ASN PRO SER SER GLU GLY LEU LYS ASP ARG ALA LEU PRO ASN TRP PHE GLY ASP TRP SER THR
GLU ALA LEU TYR GLN VAL PHE THR SER LYS MET ASP LEU GLU LYS PRO ASN TYR ILE VAL PRO ASP TYR MET PRO VAL VAL TYR ASP LYS LEU PRO GLN PRO PRO SER HIS ARG GLU ALA ILE VAL ASN SER CYS VAL PHE VAL HIS GLN THR LEU HIS GLN ASN ALA
ARG LEU ALA LYS ARG THR MET ALA ASN LEU PHE HIS GLU LYS ARG SER GLU LEU GLU GLU GLN GLN MET HIS LEU ASN VAL GLY LEU ARG LYS ILE LYS GLU THR VAL ASP GLN VAL GLU GLU LEU ARG
ARG ASP LEU ARG ILE LYS SER GLN GLN GLU ALA GLU LYS LYS VAL MET SER GLN GLU ILE GLN GLU GLN LEU HIS LYS GLN GLN GLU VAL ILE LYS GLU THR VAL ILE ALA ASP LYS GLN VAL GLU GLN LEU
GLU ASP LEU ASP LYS VAL GLU PRO ALA ILE GLN HIS LEU VAL GLU VAL ARG SER MET ALA ASN PRO PRO ALA ALA VAL LYS LEU ALA LEU GLU SER ILE CYS LEU LEU LEU GLY GLU SER THR THR ASP TRP LYS GLN ILE ARG
SER ILE ILE MET ARG GLU LYS LYS ASN TYR MET SER ASN PRO SER TYR ASN TYR GLU ILE VAL ASN ARG ALA SER LEU ALA CYS GLY PRO MET VAL LYS TRP ALA ILE ALA GLN


LEU ASN TYR ALA ASP MET LEU LYS ARG VAL GLU PRO LEU ARG ASN GLU LEU GLN LYS LEU GLU ASP ASP ALA LYS ASP ASN GLN GLN LYS ALA ASN GLU VAL GLU GLN MET ILE ARG ASP LEU GLU ALA SER ILE ALA ARG TYR LYS GLU GLU TYR ALA VAL LEU ILE SER GLU ALA GLN
ALA ILE LYS ALA ASP LEU ALA VAL GLU ALA LYS VAL ASN ARG SER THR ALA LEU LEU LYS SER LEU SER ALA GLU ARG TRP GLU LYS THR SER GLU GLU THR PHE LYS ASN GLN MET SER THR ILE ALA GLY ASP CYS LEU LEU SER ALA ALA PHE ILE ALA TYR ALA GLY TYR
PHE ASP GLN GLN MET ARG GLN ASN LEU PHE THR THR TRP SER HIS HIS LEU GLN GLN ALA LEU LEU ASN ILE GLN PHE ARG THR ASP ILE ALA ARG THR GLU TYR LEU SER ASN ALA ASP GLU ARG LEU ARG TRP GLN ALA SER SER LEU PRO ALA ASP ASP LEU CYS THR GLU ASN LEU
LEU LYS ARG PHE ASN ARG TYR PRO LEU ILE ILE ASP PRO SER GLY GLN ALA THR GLU PHE ILE MET ASN GLU TYR LYS ASP ARG LYS ILE THR GLU ASP ALA PHE ARG LYS ASN LEU GLU SER ALA LEU ARG PHE GLY ASN PRO LEU LEU VAL GLN ASP VAL GLU
SER TYR ASP PRO VAL LEU ASN PRO VAL LEU ASN ARG GLU VAL ARG ARG THR GLY GLY ARG VAL LEU ILE THR LEU GLY ASP GLN ILE THR ARG ASP ARG LEU ARG LEU SER PHE VAL ILE PHE LEU SER THR ARG ASP PRO THR VAL GLU GLY PHE PRO ASP LEU CYS SER ARG VAL THR PHE VAL
ASN PHE THR VAL THR ARG SER SER LEU GLN SER CYS LEU ASN GLU GLU VAL LEU LYS ALA GLU ARG PRO ASP VAL ASP GLU LYS ARG SER ASP LEU LEU LYS GLN GLY GLU PHE GLN LEU ARG LEU GLN LEU GLU LYS SER LEU LEU GLN ALA LEU ASN GLU VAL LYS GLY ARG
ILE LEU ASP ASP THR ILE ILE THR ARG ASP ILE ARG LYS VAL GLU GLU THR ASP ILE VAL MET GLN GLU VAL GLU THR VAL SER GLN GLN TYR LEU PRO LEU SER THR ALA CYS SER SER ILE TYR PHE THR MET GLU SER LEU SER
GLN ILE HIS PHE LEU TYR GLN TYR SER LEU GLN PHE PHE LEU ASP ILE TYR HIS ASN VAL LEU TYR GLU ASN PRO ASN LEU LYS GLY VAL THR ASP HIS THR GLN ARG LEU SER ILE ILE THR LYS ASP LEU PHE GLN VAL ALA PHE ASN ARG VAL ALA ARG GLY MET LEU HIS GLN ASP
HIS ILE THR PHE ALA MET LEU LEU ALA ARG ILE LYS LEU LYS GLY THR VAL GLY GLU PRO THR TYR ASP ALA GLU PHE GLN PRO GLU GLN ILE VAL LEU SER ALA GLY SER THR PRO ARG ILE GLN GLY LEU THR VAL GLU GLN ALA GLU ALA VAL VAL ARG LEU SER
CYS LEU PRO ALA PHE LYS ASP LEU ILE ALA LYS VAL GLN ALA ASP GLU GLN PHE GLY ILE TRP LEU ASP SER SER SER PRO GLU GLN THR VAL PRO TYR LEU TRP SER GLU GLU THR PRO ALA THR PRO ILE GLY GLN ALA ILE HIS ARG LEU LEU LEU ILE GLN ALA PHE ARG PRO ASP
ARG LEU LEU ALA MET ALA HIS MET PHE VAL SER THR ASN LEU GLY GLU GLY SER PHE MET SER ILE MET GLU GLN PRO LEU ASP LEU THR HIS ILE VAL GLY LYS PRO ASN THR PRO VAL LEU MET CYS SER VAL PRO GLY TYR ASP ALA SER GLY HIS VAL GLU ASP LEU
ALA GLU GLN ASN THR SER ILE ALA ILE GLY SER ALA GLU GLY PHE ASN GLN ALA ASP LYS ALA ILE ASN THR ALA VAL LYS SER GLY ARG TRP VAL MET LEU LYS ASN VAL HIS LEU ALA PRO GLY TRP LEU MET GLN LEU GLU LYS LYS SER LEU LEU GLN PRO HIS
ALA CYS PHE ARG LEU PHE LEU THR MET GLU ILE ASN PRO LYS VAL PRO VAL ASN LEU LEU ARG ILE PHE VAL PHE GLU PRO PRO PRO GLY VAL LYS SER ARG ILE CYS LYS SER PRO ASN GLU ARG ALA ARG LEU
TYR PHE LEU LEU ALA TRP PHE HIS ALA ILE ILE GLN GLU ARG LEU ARG TYR ALA PRO LEU GLY TRP SER LYS LYS TYR GLU PHE GLY GLU SER ASP LEU ARG SER ALA CYS ASP THR VAL ASP SER THR TRP LEU ASP ASP THR ALA LYS GLY ARG LEU ASP PRO LYS ILE PRO
TRP SER ALA LEU LYS THR LEU MET ALA GLN SER ILE TYR GLY GLY ARG VAL ASP ASN GLU PHE ASP GLN ARG LEU LEU ASN THR PHE LEU GLU ARG LEU PHE THR THR ARG SER PHE ASP SER GLU PHE LYS LEU ALA CYS LYS VAL ASP GLY HIS LYS ASP ILE SER PRO ASN GLU MET PRO ASP GLY
ILE ARG ARG GLU GLU PHE VAL GLN GLU LEU LEU PRO ASP THR GLN GLY LEU PRO ASN ASN ALA GLU ARG VAL LEU LEU THR THR GLN LEU GLY VAL ASP MET ILE SER LYS MET LEU LYS MET GLN LEU GLU ASP GLU ASP LEU ALA TYR ALA GLU
THR GLU LYS LYS THR ARG PRO ALA TRP MET ARG THR LEU HIS THR THR ALA SER ASN TRP LEU HIS LEU ILE LEU PRO GLN THR LEU SER HIS LEU LYS ARG THR VAL GLU ASN ILE LYS ASP PRO LEU PHE ARG PHE PHE GLU ARG GLU VAL LYS MET
GLY ALA LYS LEU LEU GLN THR ARG GLN ASP VAL ARG CYS GLU GLY GLN THR ASN TYR LEU ARG THR LEU ILE ASN GLU LEU VAL LYS GLY ILE LEU PRO ARG SER TRP SER HIS TYR THR VAL PRO ALA GLY MET THR VAL ILE GLN TRP VAL
SER ASP PHE SER GLU GLN ASN ILE SER ALA ALA ASP VAL ALA ALA CYS SER GLY GLY ALA LYS LYS GLU LEU LYS ASN ILE HIS VAL CYS LEU LEU GLY GLY ILE PHE VAL PRO GLU ALA TYR ILE THR ALA THR ARG GLN TYR VAL ALA GLN ALA ASN SER TRP VAL GLN LEU GLU
CYS LEU GLU VAL ASN VAL THR THR SER GLN GLY ALA THR CYS ASN ASN ASN LYS LEU SER LEU SER ASN ALA ILE SER THR ALA LEU PRO LEU THR GLN LEU ARG TRP VAL LYS GLN THR ASN THR GLU

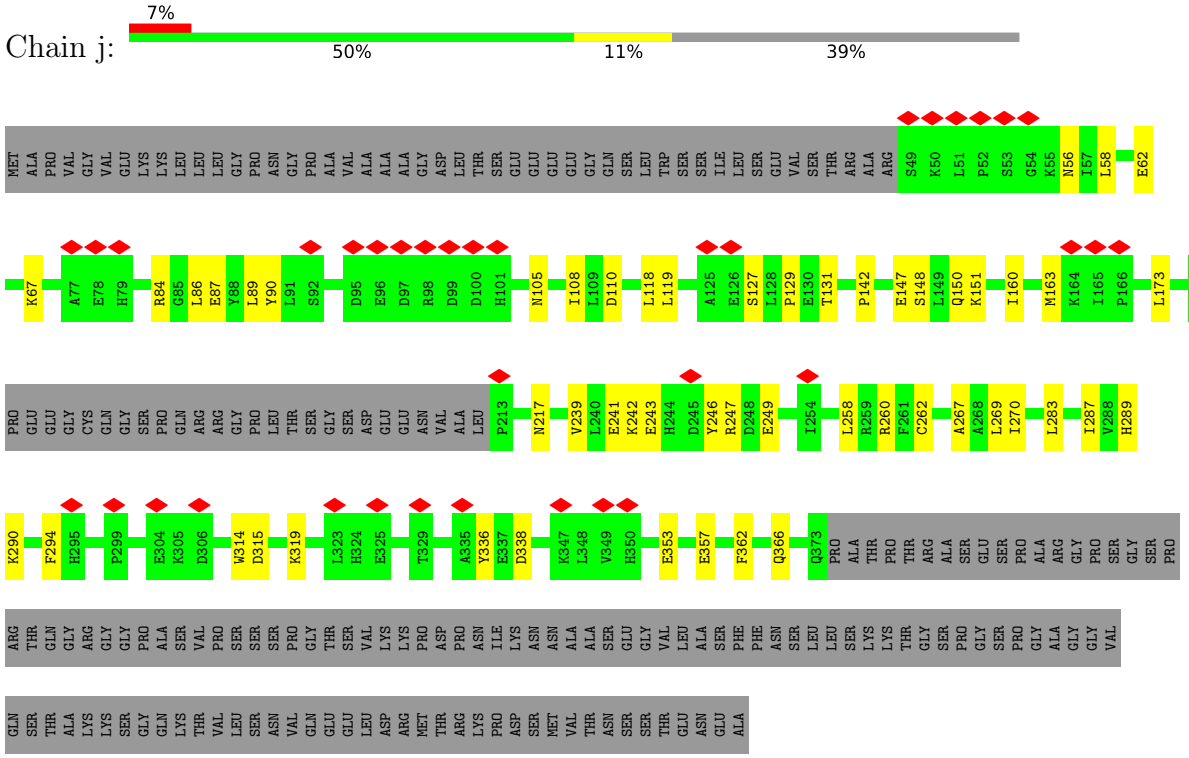
• Molecule 3: Cytoplasmic dynein 1 intermediate chain 2



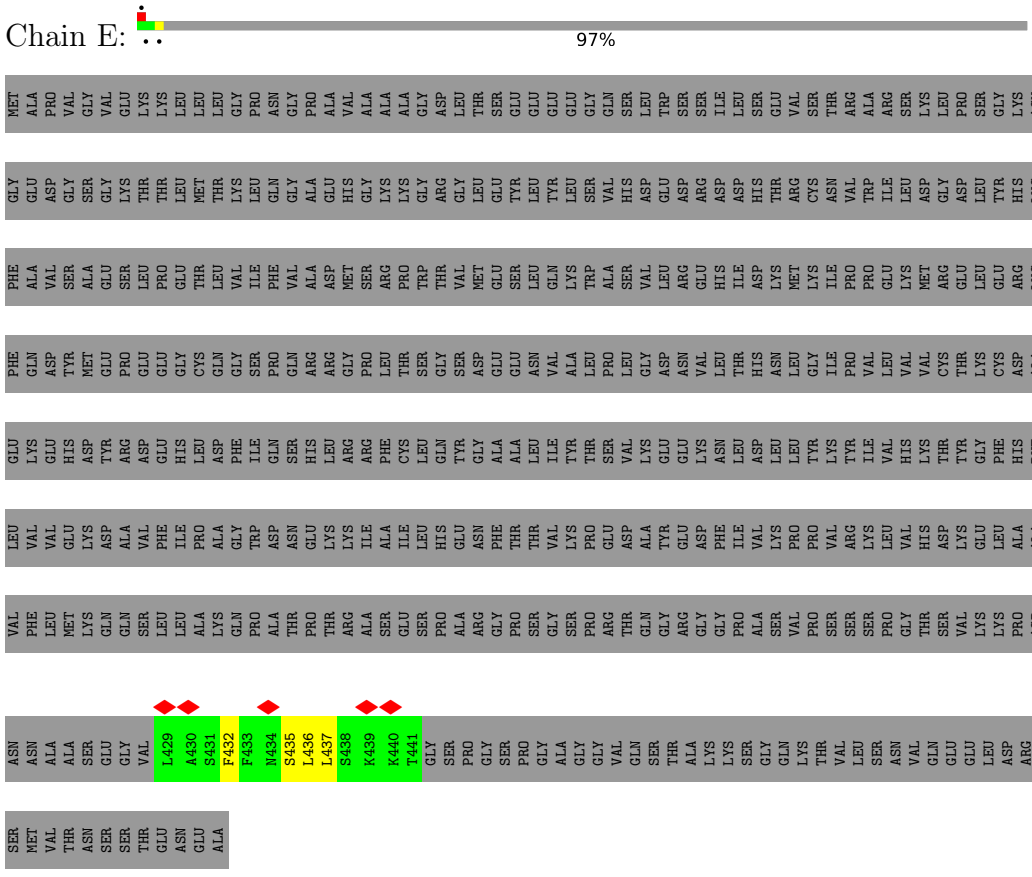
• Molecule 3: Cytoplasmic dynein 1 intermediate chain 2



• Molecule 4: Cytoplasmic dynein 1 light intermediate chain 2

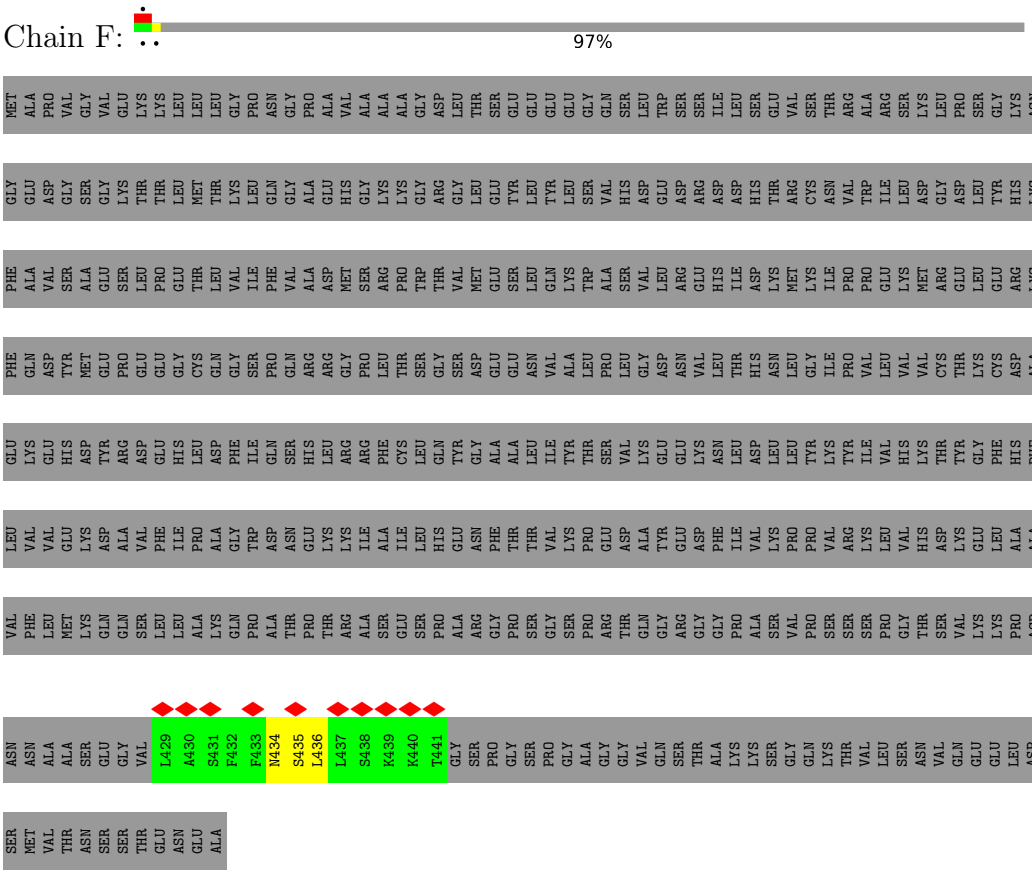


• Molecule 4: Cytoplasmic dynein 1 light intermediate chain 2



• Molecule 4: Cytoplasmic dynein 1 light intermediate chain 2

Chain F:


97%
MET ALA PRO VAL GLY VAL GLU LYS LYS LEU LEU LEU LEU GLY PRO ASN GLY PRO ALA VAL ALA ALA ALA ALA GLY ASP LEU THR SER GLU GLU GLU GLU GLY GLN SER LEU TRP SER SER ILE LEU SER GLU VAL SER THR ARG ALA ARG SER LYS LEU PRO SER GLY LYS ASN ILE LEU VAL PHE
GLY GLU ASP GLY SER GLY LYS THR THR LEU MET THR LYS LEU GLN GLY ALA GLU HIS GLY LYS LYS GLY ARG GLY LEU GLU TYR LEU TYR LEU SER VAL HIS ASP GLU ASP ARG ASP ASP HIS THR ARG CYS ASN VAL TRP ILE LEU ASP GLY ASP LEU TYR HIS LYS GLY LEU LEU LYS
PHE ALA VAL SER ALA GLU SER LEU PRO GLU THR LEU VAL ILE PHE VAL ALA ASP MET SER ARG PRO TRP THR VAL MET GLU SER LEU GLN LYS TRP ALA SER VAL LEU ARG GLU HIS ILE ASP LYS MET LYS ILE PRO PRO GLU LYS MET ARG GLU LEU GLU ARG LYS PHE VAL LYS ASP
PHE GLN ASP TYR MET GLU PRO GLU GLU GLY CYS GLN GLY SER PRO GLN ARG ARG GLY PRO LEU THR SER GLY SER ASP GLU GLU ASN VAL ALA LEU PRO LEU GLY ASP ASN VAL LEU THR HIS ASN LEU GLY ILE PRO VAL LEU VAL VAL CYS THR LYS CYS ASP ALA VAL SER VAL LEU
GLU LYS GLU HIS ASP TYR ARG ASP GLU HIS LEU ASP PHE ILE GLN SER HIS LEU ARG ARG PHE CYS LEU GLN TYR GLY ALA ALA LEU ILE TYR THR SER VAL LYS GLU GLU LYS ASN LEU ASP LEU LEU TYR LYS TYR ILE VAL HIS LYS THR TYR GLY PHE HIS PHE THR THR PRO ALA
LEU VAL VAL GLU LYS ASP ALA VAL PHE ILE PRO ALA GLY TRP ASP ASN GLU LYS LYS ILE ALA ILE LEU HIS GLU ASN PHE THR THR VAL LYS PRO GLU ASP ALA TYR GLU ASP PHE ILE VAL LYS PRO PRO VAL ARG LYS LEU VAL HIS ASP LYS GLU LEU ALA ALA GLU ASP GLU GLN
VAL PHE LEU MET LYS GLN GLN SER LEU LEU ALA LYS GLN PRO ALA THR PRO THR ARG ALA SER GLU SER PRO ALA ARG GLY PRO SER GLY SER PRO GLY ALA GLY GLY ARG GLY PRO ALA SER VAL PRO SER SER SER PRO GLY THR SER VAL LYS LYS PRO ASP PRO ASN ILE LYS
ASN ASN ALA ALA SER GLU GLY VAL L429 A430 S431 F432 F433 N434 S435 L436 L437 S438 K439 K440 T441 GLY SER PRO GLY SER PRO GLY ALA GLY GLY VAL GLN SER THR ALA LYS LYS SER GLY GLN LYS THR VAL LEU SER ASN VAL GLN GLU GLU LEU ASP ARG MET THR ARG LYS PRO ASP
SER MET VAL THR ASN SER SER THR GLU ASN GLU ALA

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	37297	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 ($e^-/Å^2$)	53	Depositor
Minimum defocus (nm)	500	Depositor
Maximum defocus (nm)	4000	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.023	Depositor
Minimum map value	-0.010	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.001	Depositor
Recommended contour level	0.004	Depositor
Map size (Å)	296.52002, 296.52002, 296.52002	wwPDB
Map dimensions	280, 280, 280	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.059, 1.059, 1.059	Depositor

5 Model quality (i)

5.1 Standard geometry (i)

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$\|Z\|$ >5	RMSZ	#$\|Z\|$ >5
1	B	0.30	0/889	0.71	0/1194
1	C	0.30	0/895	0.78	0/1202
2	f	0.25	0/3512	0.55	3/4739 (0.1%)
2	m	0.26	0/4391	0.61	4/5912 (0.1%)
3	h	0.27	0/2976	0.46	1/4058 (0.0%)
3	o	0.30	0/2976	0.50	0/4058
4	E	0.78	0/64	1.38	1/88 (1.1%)
4	F	0.48	0/64	1.15	1/88 (1.1%)
4	j	0.20	0/2483	0.54	0/3352
All	All	0.27	0/18250	0.57	10/24691 (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	f	0	1
2	m	0	1
All	All	0	2

There are no bond length outliers.

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	f	662	MET	CB-CG-SD	6.29	131.58	112.70
2	m	357	LEU	CA-CB-CG	6.29	138.30	116.30
2	m	393	LEU	CA-CB-CG	6.21	138.02	116.30
4	E	437	LEU	N-CA-C	6.11	117.74	111.14
4	F	434	ASN	N-CA-C	-5.49	105.38	111.36
2	m	336	MET	CB-CG-SD	5.46	129.06	112.70
2	f	905	MET	CB-CG-SD	5.39	128.88	112.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	m	846	LYS	CA-CB-CG	5.20	124.50	114.10
2	f	605	GLN	CA-CB-CG	5.13	124.36	114.10
3	h	292	MET	CB-CG-SD	5.05	127.85	112.70

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	f	1003	ARG	Sidechain
2	m	339	PHE	Mainchain

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	B	880	0	857	13	0
1	C	886	0	862	14	0
2	f	3449	0	3509	42	0
2	m	4321	0	4434	49	0
3	h	2897	0	2749	35	0
3	o	2897	0	2749	46	0
4	E	65	0	28	2	0
4	F	65	0	28	1	0
4	j	2428	0	2430	33	0
All	All	17888	0	17646	219	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 6.

All (219) 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)
3:o:296:LYS:HD2	3:o:298:THR:OG1	1.79	0.82
3:o:601:ASP:O	3:o:604:GLU:HG2	1.89	0.73
3:o:600:ALA:O	3:o:603:GLU:HG2	1.90	0.72

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:f:994:LEU:HD12	2:f:1020:ARG:HD3	1.76	0.67
3:h:305:CYS:SG	3:h:306:GLN:N	2.70	0.64
2:f:1012:LEU:HB3	2:f:1016:GLU:HG3	1.81	0.63
1:B:87:ASN:OD1	1:C:87:ASN:ND2	2.32	0.62
2:f:911:LEU:HD12	2:f:993:VAL:HG23	1.82	0.60
2:f:909:ARG:HB2	2:f:1025:ARG:HH21	1.66	0.60
2:m:351:ASP:N	2:m:351:ASP:OD1	2.34	0.60
2:f:569:ARG:NH1	2:f:603:GLU:OE1	2.35	0.60
2:m:593:VAL:HG13	2:m:671:LYS:HE3	1.84	0.60
3:o:512:ALA:HB1	3:o:528:LEU:HB2	1.82	0.60
1:B:58:LEU:HD21	1:C:36:ILE:HG12	1.82	0.59
4:j:84:ARG:NH2	4:j:110:ASP:OD2	2.36	0.59
2:m:274:GLU:OE2	2:m:376:ARG:NH1	2.37	0.58
2:f:990:LYS:NZ	4:j:84:ARG:O	2.37	0.57
3:o:296:LYS:CD	3:o:298:THR:OG1	2.52	0.57
3:o:521:GLY:HA2	3:o:547:LEU:HG	1.86	0.57
3:h:505:MET:HE1	3:h:551:ARG:HA	1.87	0.57
2:f:798:ARG:NH1	2:f:854:GLU:OE1	2.38	0.57
3:o:475:SER:OG	3:o:476:PHE:N	2.36	0.55
3:o:305:CYS:SG	3:o:306:GLN:N	2.80	0.55
3:o:309:VAL:HA	3:o:326:THR:HA	1.88	0.55
4:j:357:GLU:HG3	4:j:362:PHE:HB2	1.88	0.55
2:m:442:ARG:HH22	2:m:446:LEU:HD13	1.71	0.55
3:o:254:ARG:NH1	3:o:284:ASP:O	2.40	0.54
2:f:716:ARG:HA	2:f:823:VAL:HA	1.89	0.54
4:j:62:GLU:O	4:j:67:LYS:NZ	2.41	0.54
2:m:365:ARG:O	2:m:365:ARG:NE	2.39	0.54
2:f:709:ARG:O	2:f:709:ARG:NH1	2.37	0.54
2:f:738:ASN:HB3	2:f:824:TRP:HE1	1.73	0.54
3:o:572:ASP:OD1	3:o:572:ASP:N	2.41	0.54
2:f:1001:SER:OG	2:f:1002:GLN:N	2.41	0.53
3:h:452:PRO:HD2	3:h:476:PHE:HB2	1.90	0.53
2:m:375:GLN:HE21	2:m:449:VAL:HG22	1.73	0.53
3:o:563:ASP:OD1	3:o:567:GLN:N	2.41	0.53
1:B:66:LEU:HD13	1:C:66:LEU:HD22	1.89	0.53
2:f:723:THR:OG1	2:f:734:LYS:NZ	2.42	0.53
2:f:803:LEU:O	2:f:895:ASN:ND2	2.42	0.52
2:m:642:PRO:HG2	2:m:645:SER:HB3	1.89	0.52
3:h:523:LEU:HD21	3:h:559:ILE:HD11	1.90	0.52
3:h:255:VAL:HG13	3:h:564:SER:HA	1.90	0.52
2:m:350:LEU:HA	2:m:353:ILE:HD12	1.92	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:o:531:ASP:N	3:o:531:ASP:OD1	2.42	0.52
2:f:737:VAL:HG21	2:f:781:LEU:HB3	1.92	0.52
4:j:258:LEU:HD11	4:j:269:LEU:HD22	1.91	0.52
3:o:452:PRO:HD2	3:o:476:PHE:HB2	1.92	0.52
3:o:489:LYS:HB3	3:o:599:ARG:HH12	1.75	0.52
2:m:830:ASP:O	2:m:834:GLN:NE2	2.44	0.51
3:h:376:SER:OG	3:h:377:THR:N	2.42	0.51
4:j:289:HIS:ND1	4:j:294:PHE:O	2.44	0.51
3:o:557:ARG:NH1	3:o:575:GLU:OE1	2.43	0.51
2:m:451:ARG:HH22	2:m:453:ASN:HB2	1.75	0.51
2:m:711:LEU:HB3	2:m:743:ILE:HD12	1.92	0.51
3:o:376:SER:OG	3:o:377:THR:N	2.44	0.51
2:m:845:GLU:HG2	2:m:846:LYS:HD3	1.91	0.51
2:m:381:VAL:HA	2:m:384:ILE:HG12	1.93	0.51
3:h:520:MET:O	3:h:544:ASN:ND2	2.43	0.51
2:m:577:ASN:N	2:m:580:GLU:OE2	2.42	0.51
2:m:355:GLN:HA	2:m:358:VAL:HG22	1.92	0.50
3:o:449:HIS:ND1	3:o:477:ASP:OD2	2.36	0.50
3:h:294:TYR:HB2	3:h:296:LYS:HZ2	1.77	0.50
3:o:491:LEU:HD13	3:o:596:ASN:HD21	1.77	0.49
2:f:609:ILE:HG21	2:f:678:GLU:HB3	1.95	0.49
3:o:239:LEU:HD13	3:o:539:ILE:HG12	1.94	0.49
2:m:702:TRP:NE1	2:m:749:GLU:OE1	2.41	0.49
3:h:289:VAL:HB	3:h:301:TYR:HB2	1.94	0.49
2:f:786:ARG:HB3	3:h:306:GLN:HE22	1.78	0.49
3:h:385:SER:H	3:h:393:GLN:HE22	1.59	0.49
2:f:578:ALA:HB2	2:f:611:ARG:HG2	1.94	0.49
1:B:69:VAL:HG11	1:C:70:LEU:HD22	1.95	0.48
2:f:598:ARG:HG2	2:f:602:ARG:HE	1.77	0.48
3:o:267:GLU:HB2	3:o:292:MET:HB2	1.96	0.48
2:m:377:ALA:HA	2:m:380:LEU:HG	1.95	0.48
3:o:239:LEU:HB3	3:o:539:ILE:HD13	1.96	0.48
2:f:987:PHE:HA	2:f:990:LYS:HE2	1.96	0.48
4:j:142:PRO:O	4:j:336:TYR:OH	2.32	0.48
3:h:475:SER:OG	3:h:477:ASP:OD1	2.28	0.48
3:h:503:ASP:OD2	3:h:549:ARG:NE	2.45	0.48
3:o:352:ALA:O	3:o:380:LYS:NZ	2.45	0.48
2:f:632:ALA:O	2:f:636:SER:HB3	2.13	0.48
2:m:482:ARG:NH1	3:o:608:THR:HG21	2.29	0.48
4:j:217:ASN:O	4:j:260:ARG:NH2	2.47	0.47
2:m:264:ARG:O	2:m:376:ARG:NH2	2.39	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:o:260:ASP:OD1	3:o:261:TRP:N	2.47	0.47
3:o:343:PRO:O	3:o:346:ARG:NH2	2.47	0.47
4:E:435:SER:O	4:E:436:LEU:C	2.56	0.47
3:h:474:SER:HB2	3:h:504:VAL:HG12	1.95	0.47
3:o:487:ASN:ND2	3:o:489:LYS:O	2.48	0.47
2:f:820:ILE:HD13	4:j:366:GLN:HB3	1.97	0.47
3:h:396:MET:HE3	3:h:396:MET:HB2	1.75	0.47
1:C:122:LEU:HA	1:C:125:GLN:HG3	1.97	0.46
3:h:518:ASP:OD1	3:h:522:ARG:N	2.47	0.46
4:j:148:SER:HA	4:j:151:LYS:HG2	1.96	0.46
3:o:340:LYS:HD2	3:o:340:LYS:HA	1.80	0.46
4:j:338:ASP:N	4:j:338:ASP:OD1	2.49	0.46
2:m:818:GLU:OE2	2:m:835:ARG:NH2	2.49	0.46
2:m:434:LEU:HA	2:m:437:ILE:HG22	1.98	0.46
2:m:347:ALA:O	2:m:391:GLN:NE2	2.49	0.46
1:B:83:LEU:O	1:B:87:ASN:HB2	2.16	0.46
3:h:321:LEU:HD13	3:h:333:LEU:HD11	1.98	0.46
4:j:163:MET:SD	4:j:163:MET:N	2.83	0.46
3:h:505:MET:HB3	3:h:505:MET:HE2	1.74	0.46
1:B:36:ILE:HD11	1:B:63:LEU:HD11	1.96	0.46
3:o:321:LEU:HB3	3:o:333:LEU:HD11	1.97	0.46
3:o:576:GLN:HG2	3:o:577:ILE:HG13	1.98	0.46
2:f:786:ARG:NH2	3:h:284:ASP:OD2	2.50	0.45
2:m:716:ARG:HG2	2:m:823:VAL:HG12	1.97	0.45
2:m:442:ARG:O	2:m:442:ARG:NE	2.45	0.45
2:m:541:GLU:H	2:m:541:GLU:HG3	1.57	0.45
3:o:296:LYS:CG	3:o:298:THR:OG1	2.64	0.45
2:f:707:GLN:HG3	2:f:764:ILE:HD11	1.98	0.45
4:j:58:LEU:HD23	4:j:58:LEU:HA	1.86	0.45
4:j:247:ARG:HG3	4:j:249:GLU:H	1.80	0.45
3:o:532:THR:HG21	3:o:595:ILE:HD11	1.97	0.45
3:h:388:MET:SD	3:h:390:SER:OG	2.75	0.45
3:h:513:LEU:HD11	3:h:525:LEU:HD23	1.98	0.45
4:j:86:LEU:HD11	4:j:118:LEU:HB3	1.98	0.45
4:j:127:SER:O	4:j:131:THR:OG1	2.31	0.45
4:j:314:TRP:O	4:j:319:LYS:NZ	2.48	0.45
2:m:787:THR:HG22	2:m:790:ARG:HH21	1.82	0.45
3:o:330:GLN:HG2	3:o:349:LEU:HD21	1.97	0.45
2:m:783:GLU:O	2:m:787:THR:OG1	2.31	0.45
3:o:385:SER:N	3:o:393:GLN:OE1	2.46	0.45
3:h:547:LEU:HD12	3:h:563:ASP:HB3	1.99	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:m:335:LEU:HD23	2:m:366:LYS:HG3	1.98	0.44
3:o:270:VAL:HG12	3:o:289:VAL:HG22	1.99	0.44
1:B:32:LEU:HD13	1:B:32:LEU:HA	1.85	0.44
3:o:356:HIS:ND1	3:o:378:ASP:OD2	2.49	0.44
1:B:43:LEU:HD11	1:C:51:VAL:HA	1.99	0.44
2:f:734:LYS:HE2	2:f:734:LYS:HB2	1.76	0.44
3:h:330:GLN:HG3	3:h:349:LEU:HD21	2.00	0.44
4:j:147:GLU:HA	4:j:150:GLN:HE21	1.82	0.44
3:o:366:THR:O	3:o:370:HIS:ND1	2.44	0.44
1:C:81:GLU:OE1	1:C:84:ARG:NH1	2.51	0.44
2:m:694:ASN:ND2	2:m:697:GLU:OE1	2.51	0.44
3:o:422:VAL:HG12	3:o:432:THR:HG22	1.99	0.44
3:h:505:MET:HE1	3:h:552:TRP:H	1.83	0.44
2:f:641:LEU:HD23	2:f:641:LEU:HA	1.89	0.43
4:j:241:GLU:HA	4:j:246:TYR:HB2	2.00	0.43
4:j:262:CYS:HA	4:j:267:ALA:HB3	2.01	0.43
2:f:1006:VAL:HG21	2:m:650:TRP:HZ3	1.82	0.43
4:j:315:ASP:OD1	4:j:315:ASP:N	2.39	0.43
1:B:37:TYR:OH	4:E:432:PHE:CB	2.66	0.43
2:m:525:LEU:HD23	2:m:525:LEU:HA	1.91	0.43
2:f:711:LEU:HD13	2:f:743:ILE:HG12	2.00	0.43
2:m:581:MET:O	2:m:585:PHE:HB2	2.19	0.43
3:h:451:GLY:N	3:h:477:ASP:OD2	2.52	0.43
2:m:557:ILE:HD13	2:m:557:ILE:HA	1.90	0.43
2:m:561:GLU:HG2	2:m:597:ILE:HD11	1.99	0.43
3:o:450:GLN:N	3:o:450:GLN:OE1	2.51	0.43
1:C:115:LEU:HD12	1:C:115:LEU:HA	1.81	0.43
2:f:678:GLU:HA	2:f:681:LYS:HG2	2.01	0.43
2:f:862:ARG:HA	2:f:862:ARG:HD3	1.76	0.43
3:h:375:ILE:HG12	3:h:381:ILE:HB	2.00	0.42
4:F:435:SER:O	4:F:436:LEU:C	2.61	0.42
2:f:1005:GLN:H	2:f:1005:GLN:HG3	1.61	0.42
3:h:489:LYS:HA	3:h:489:LYS:HD3	1.85	0.42
4:j:87:GLU:HB2	4:j:108:ILE:HD12	2.00	0.42
2:m:340:PRO:HD3	2:m:363:HIS:ND1	2.35	0.42
1:C:57:PRO:HA	1:C:60:VAL:HG12	2.01	0.42
2:m:407:GLU:OE1	2:m:407:GLU:N	2.46	0.42
4:j:283:LEU:O	4:j:287:ILE:HG12	2.19	0.42
3:h:521:GLY:HA2	3:h:547:LEU:HD13	2.00	0.42
3:h:558:GLU:HA	3:h:572:ASP:HA	2.01	0.42
4:j:290:LYS:HA	4:j:290:LYS:HD2	1.91	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:m:278:TRP:HB3	2:m:336:MET:HG3	2.01	0.42
1:B:53:LYS:HA	1:B:53:LYS:HD2	1.87	0.42
3:h:354:HIS:NE2	3:h:374:SER:OG	2.45	0.42
4:j:160:ILE:HD12	4:j:160:ILE:HA	1.84	0.42
2:m:459:LEU:O	2:m:463:LEU:HG	2.20	0.42
2:m:622:LYS:NZ	3:o:498:ALA:O	2.47	0.42
1:B:83:LEU:HB2	1:C:83:LEU:HD11	2.01	0.42
4:j:119:LEU:HD12	4:j:119:LEU:HA	1.90	0.42
4:j:242:LYS:HA	4:j:242:LYS:HD2	1.90	0.42
2:m:577:ASN:OD1	2:m:578:ALA:N	2.53	0.42
2:m:744:ILE:HD12	2:m:744:ILE:HA	1.92	0.42
2:f:915:LEU:HD13	2:f:993:VAL:HG11	2.02	0.42
2:f:1017:LYS:HE2	2:f:1017:LYS:HB2	1.81	0.42
2:m:561:GLU:O	2:m:565:THR:OG1	2.32	0.42
1:C:50:GLU:O	1:C:53:LYS:NZ	2.52	0.41
1:B:72:GLU:O	1:B:76:HIS:ND1	2.52	0.41
2:f:904:ASP:HA	2:f:907:ILE:HG22	2.02	0.41
1:C:89:GLN:NE2	2:f:827:TYR:O	2.51	0.41
2:f:864:LEU:HA	2:f:864:LEU:HD23	1.82	0.41
1:B:65:ASN:OD1	1:C:28:ARG:NH2	2.53	0.41
2:f:631:GLN:HA	2:f:634:LYS:HG2	2.02	0.41
3:h:383:SER:HB3	3:h:394:ASP:HB2	2.02	0.41
4:j:129:PRO:HG3	4:j:173:LEU:HD11	2.02	0.41
4:j:90:TYR:HA	4:j:105:ASN:HA	2.03	0.41
2:m:740:LEU:HA	2:m:741:PRO:HD3	1.95	0.41
3:o:311:SER:HB2	3:o:361:VAL:HG22	2.03	0.41
1:C:115:LEU:HD12	1:C:118:GLU:HB3	2.02	0.41
2:m:459:LEU:HD12	2:m:459:LEU:HA	1.93	0.41
2:f:998:ARG:HA	2:f:1019:TYR:CZ	2.56	0.41
3:h:326:THR:HG23	3:h:328:SER:H	1.86	0.41
4:j:243:GLU:OE2	4:j:243:GLU:N	2.54	0.41
2:m:399:ARG:HA	2:m:399:ARG:HD3	1.87	0.41
2:m:649:ILE:HD13	2:m:649:ILE:HA	1.96	0.41
3:o:292:MET:HA	3:o:292:MET:HE2	2.02	0.41
3:o:601:ASP:O	3:o:605:GLU:HG3	2.21	0.41
2:f:804:LEU:HB3	2:f:850:LEU:HD11	2.03	0.41
2:f:1016:GLU:H	2:f:1016:GLU:HG2	1.70	0.41
3:h:539:ILE:HD12	3:h:539:ILE:HA	1.99	0.41
4:j:270:ILE:HD12	4:j:283:LEU:HD13	2.03	0.41
4:j:89:LEU:HD12	4:j:89:LEU:HA	1.88	0.40
3:o:503:ASP:HB2	3:o:550:VAL:HG12	2.03	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:f:621:ASP:HA	2:f:624:LYS:HG2	2.03	0.40
3:h:473:THR:OG1	3:h:483:TRP:NE1	2.51	0.40
4:j:56:ASN:HB3	4:j:131:THR:HA	2.03	0.40
2:m:569:ARG:HD2	2:m:569:ARG:HA	1.91	0.40
3:o:431:TYR:HB3	3:o:442:ILE:HG23	2.02	0.40
2:f:631:GLN:H	2:f:631:GLN:HG3	1.76	0.40
3:h:316:LYS:HE3	3:h:316:LYS:HB2	1.75	0.40
2:m:353:ILE:O	2:m:357:LEU:HD12	2.21	0.40
2:m:581:MET:HA	2:m:584:ILE:HG22	2.03	0.40
3:o:505:MET:HE2	3:o:505:MET:HB2	2.00	0.40
2:f:753:LEU:HD23	2:f:756:LEU:HD12	2.03	0.40

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	B	103/581 (18%)	101 (98%)	2 (2%)	0	100	100
1	C	104/581 (18%)	102 (98%)	2 (2%)	0	100	100
2	f	416/4646 (9%)	402 (97%)	14 (3%)	0	100	100
2	m	515/4646 (11%)	509 (99%)	6 (1%)	0	100	100
3	h	369/612 (60%)	357 (97%)	12 (3%)	0	100	100
3	o	369/612 (60%)	355 (96%)	14 (4%)	0	100	100
4	E	11/492 (2%)	11 (100%)	0	0	100	100
4	F	11/492 (2%)	9 (82%)	2 (18%)	0	100	100
4	j	295/492 (60%)	280 (95%)	14 (5%)	1 (0%)	36	69
All	All	2193/13154 (17%)	2126 (97%)	66 (3%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	j	353	GLU

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	B	99/514 (19%)	99 (100%)	0	100	100
1	C	100/514 (20%)	98 (98%)	2 (2%)	48	65
2	f	377/4125 (9%)	374 (99%)	3 (1%)	73	77
2	m	467/4125 (11%)	465 (100%)	2 (0%)	84	83
3	h	316/531 (60%)	315 (100%)	1 (0%)	86	85
3	o	316/531 (60%)	313 (99%)	3 (1%)	70	75
4	j	268/422 (64%)	267 (100%)	1 (0%)	84	83
All	All	1943/10762 (18%)	1931 (99%)	12 (1%)	76	80

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	83	LEU
1	C	100	LEU
2	f	713	VAL
2	f	755	TRP
2	f	993	VAL
3	h	381	ILE
4	j	239	VAL
2	m	576	LYS
2	m	836	LEU
3	o	381	ILE
3	o	400	HIS
3	o	436	HIS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (33) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	74	GLN
1	B	87	ASN
1	C	87	ASN
1	C	123	GLN
2	f	596	HIS
2	f	620	HIS
2	f	631	GLN
2	f	657	GLN
2	f	731	ASN
2	f	770	GLN
2	f	1000	GLN
2	f	1002	GLN
3	h	242	ASN
3	h	275	ASN
3	h	339	ASN
3	h	391	HIS
3	h	488	ASN
3	h	497	ASN
3	h	527	ASN
4	j	75	GLN
4	j	182	GLN
4	j	373	GLN
2	m	280	ASN
2	m	355	GLN
2	m	589	ASN
2	m	629	GLN
2	m	653	GLN
2	m	694	ASN
2	m	708	GLN
3	o	345	GLN
3	o	469	HIS
3	o	554	HIS
3	o	596	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)

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

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

There are no ligands in this entry.

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

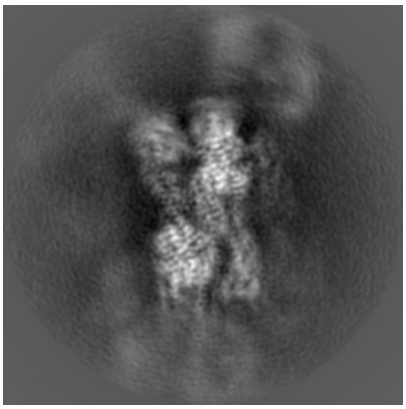
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-17833. These allow visual inspection of the internal detail of the map and identification of artifacts.

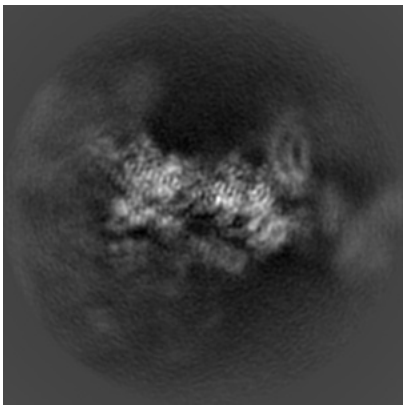
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

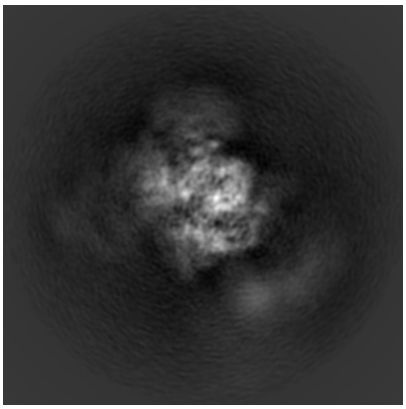
6.1.1 Primary map



X

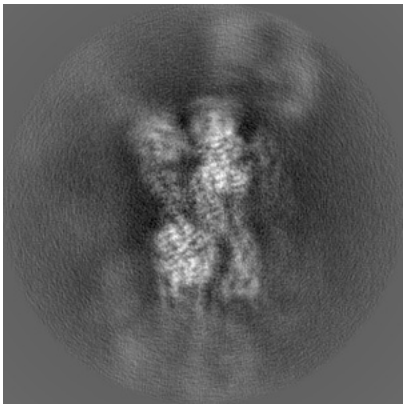


Y

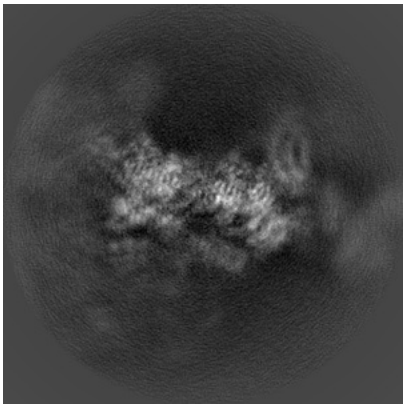


Z

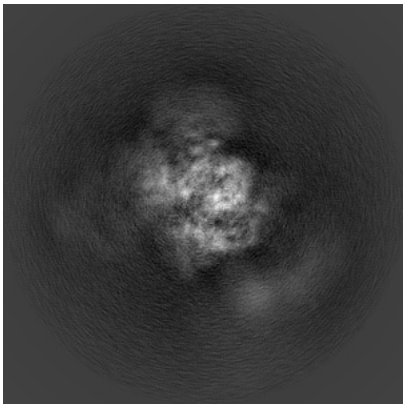
6.1.2 Raw map



X



Y

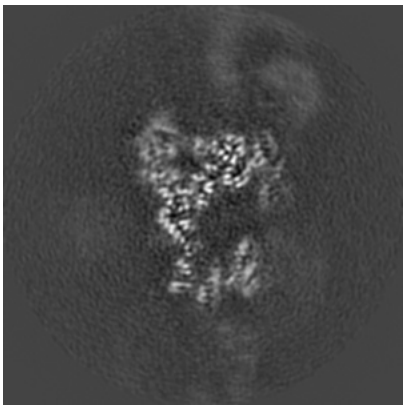


Z

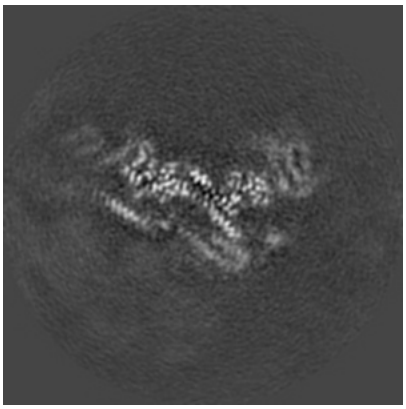
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

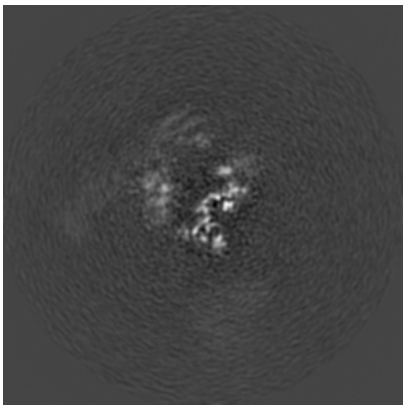
6.2.1 Primary map



X Index: 140

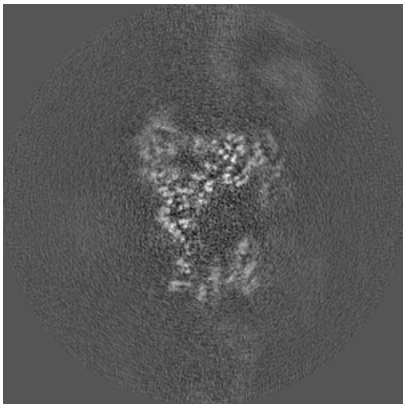


Y Index: 140

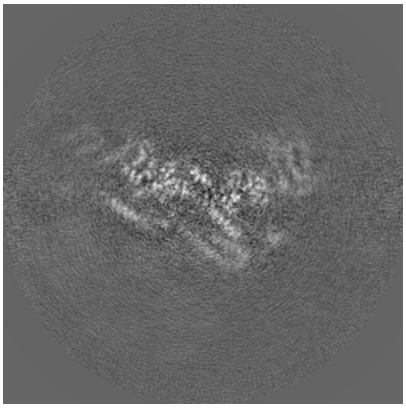


Z Index: 140

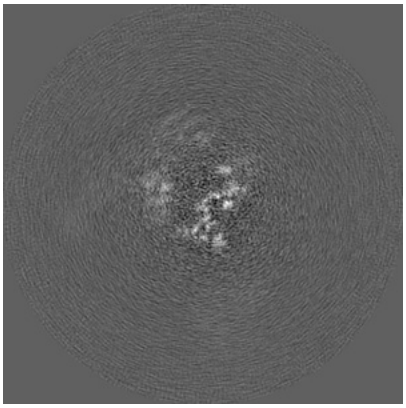
6.2.2 Raw map



X Index: 140



Y Index: 140

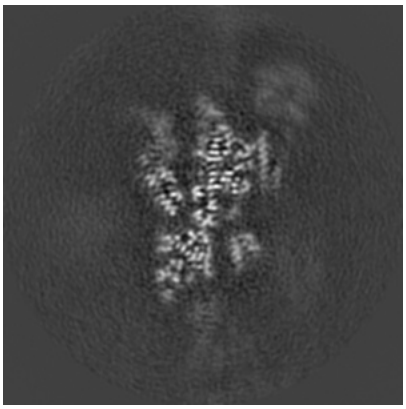


Z Index: 140

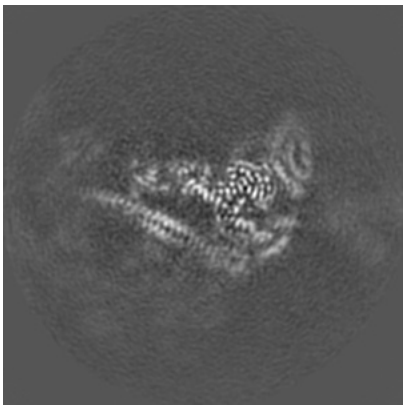
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

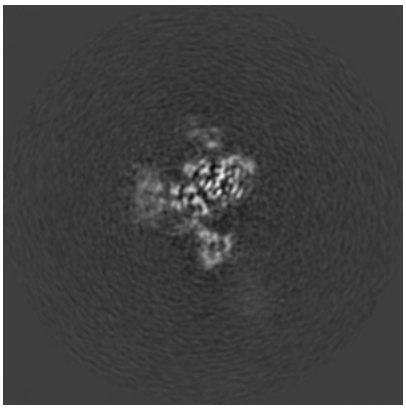
6.3.1 Primary map



X Index: 149

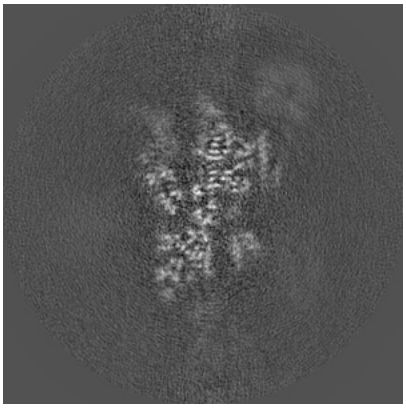


Y Index: 146

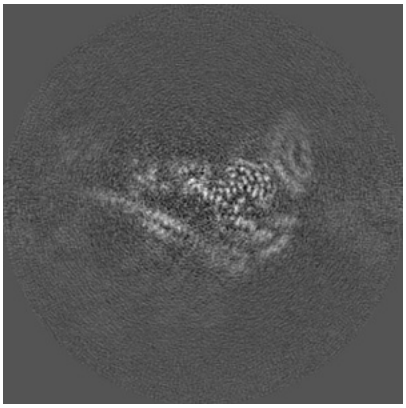


Z Index: 158

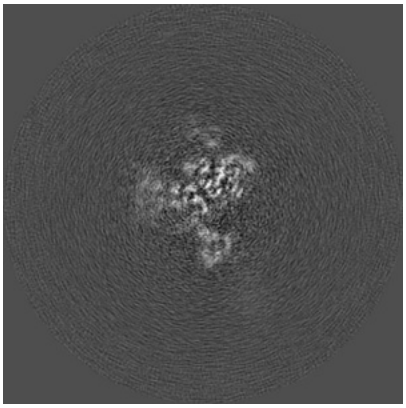
6.3.2 Raw map



X Index: 149



Y Index: 146

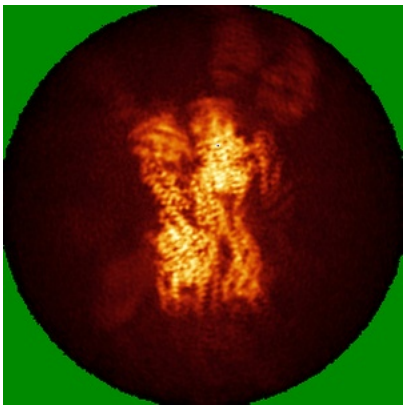


Z Index: 158

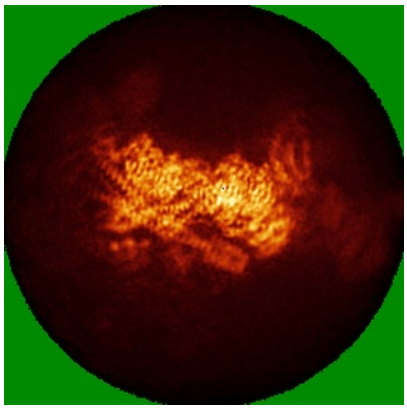
The images above show the largest variance slices of the map in three orthogonal directions.

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

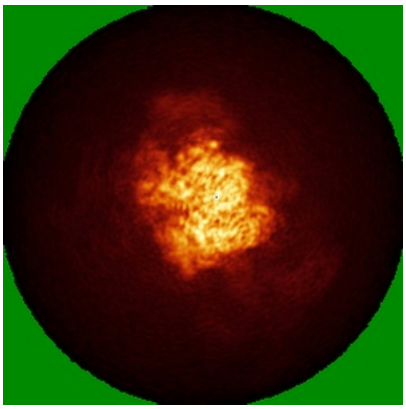
6.4.1 Primary map



X

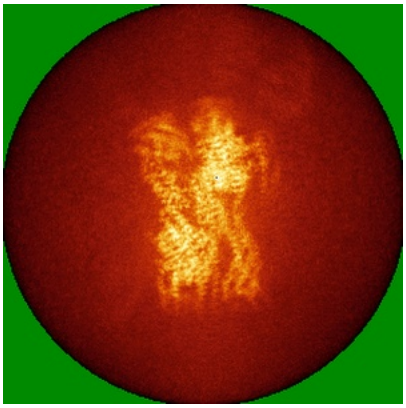


Y

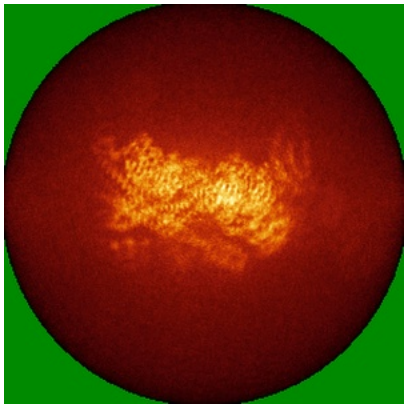


Z

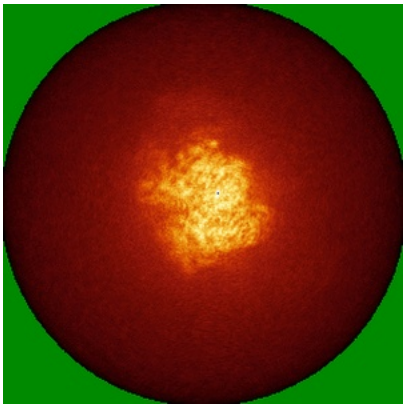
6.4.2 Raw map



X



Y

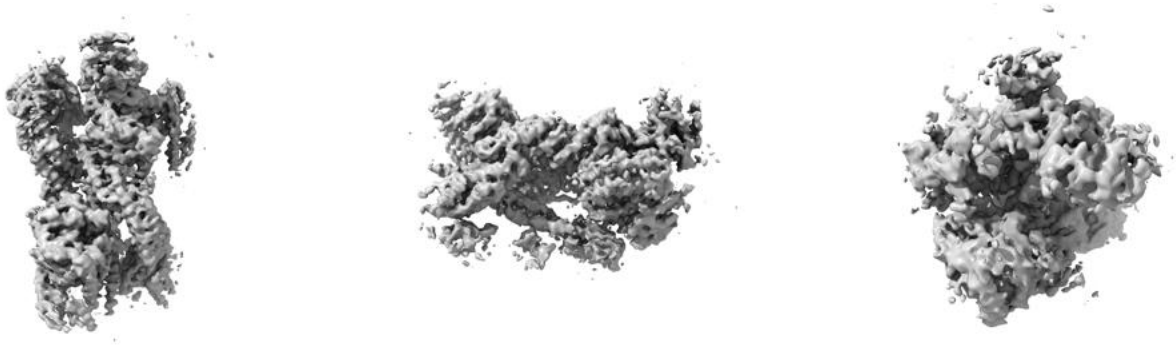


Z

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

6.5.2 Raw map

X Y Z

These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

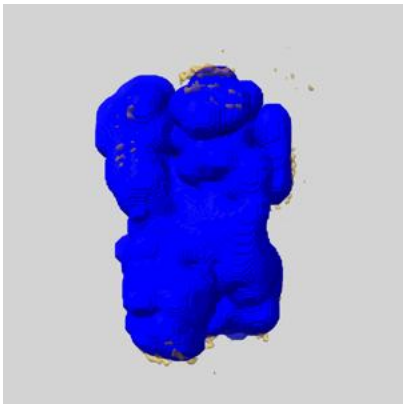
6.6 Mask visualisation (i)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

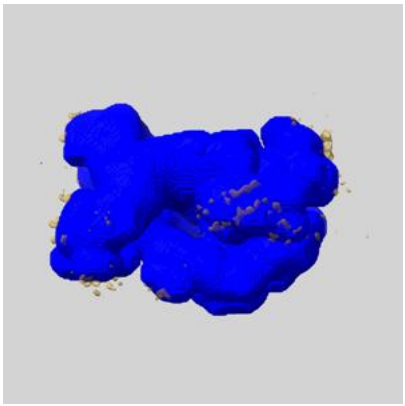
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

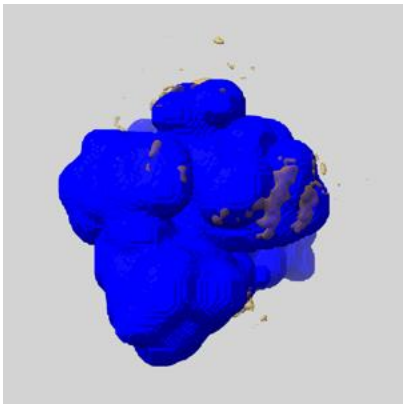
6.6.1 emd_17833_msk_1.map (i)



X



Y

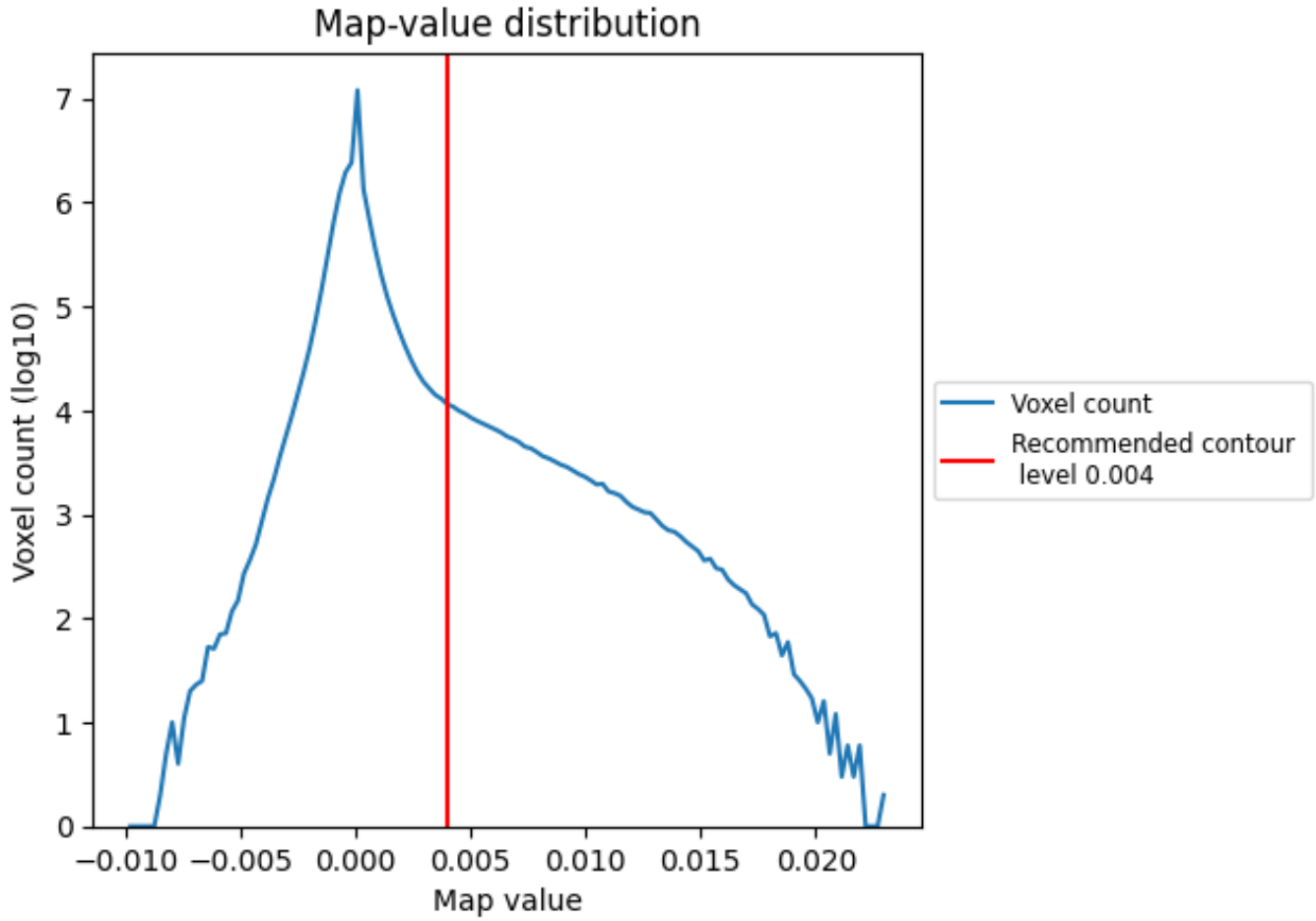


Z

7 Map analysis

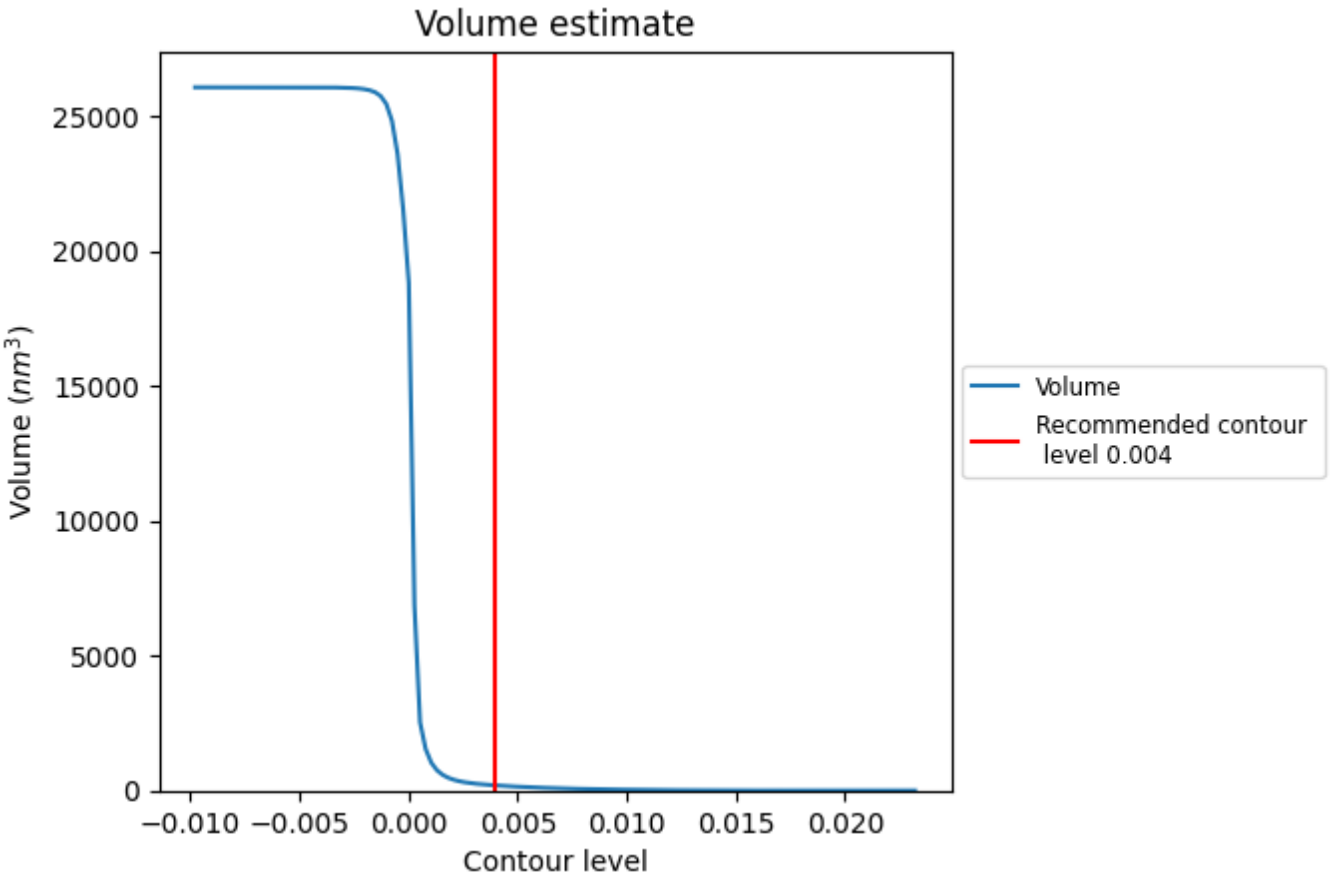
This section contains the results of statistical analysis of the map.

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.

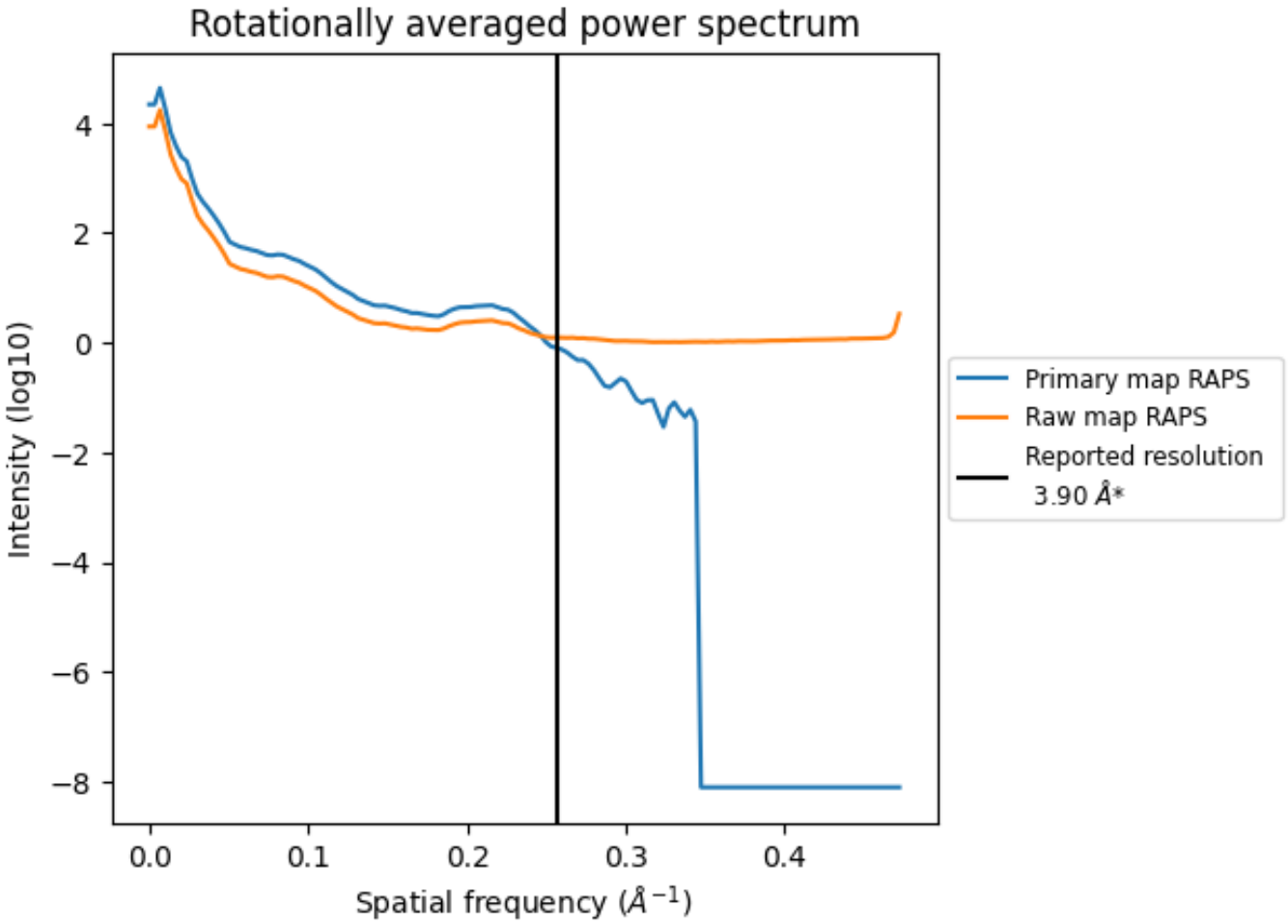
7.2 Volume estimate



The volume at the recommended contour level is 192 nm^3; this corresponds to an approximate mass of 173 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)

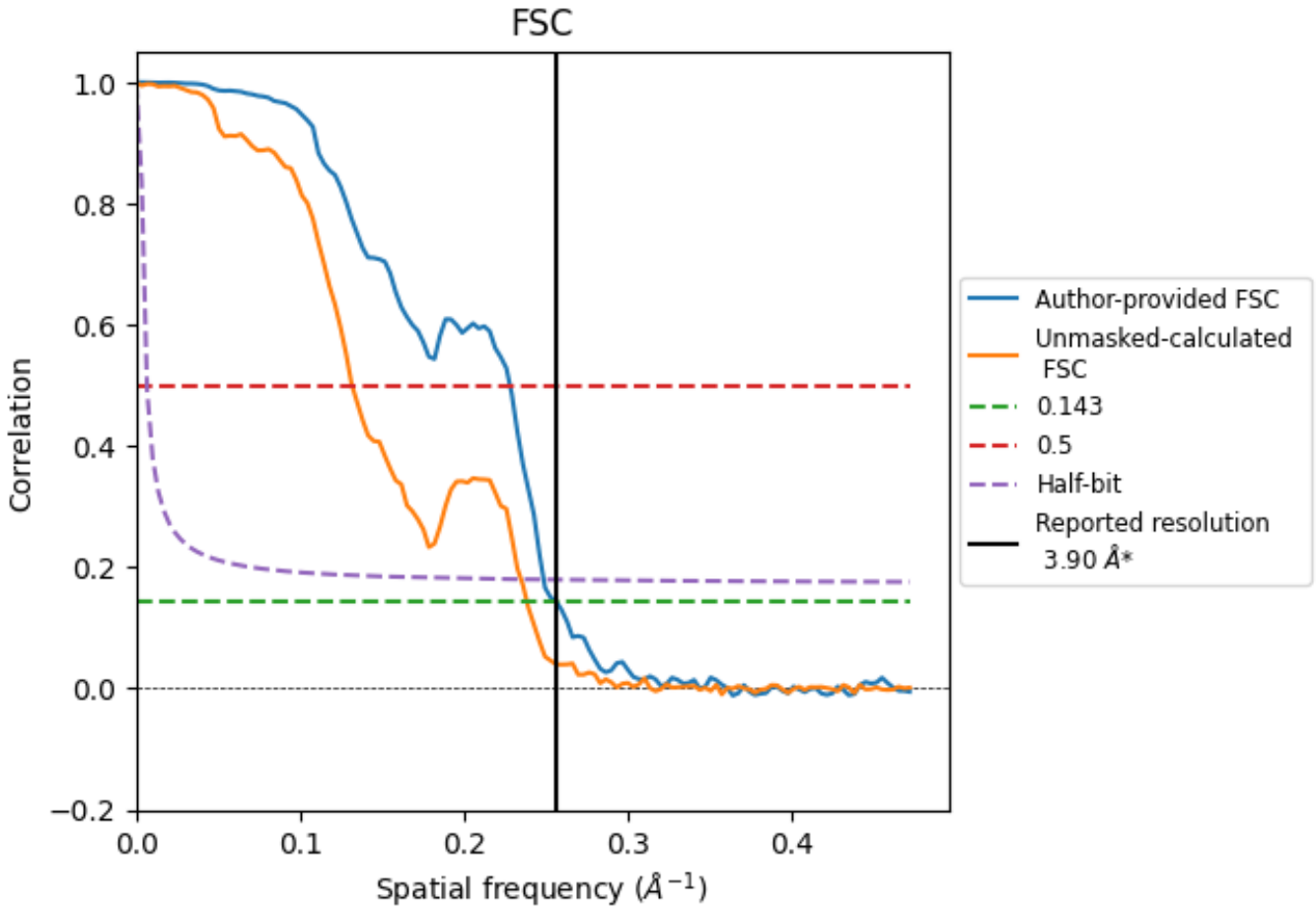


*Reported resolution corresponds to spatial frequency of 0.256 Å^{-1}

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 0.256 $Å^{-1}$

8.2 Resolution estimates (i)

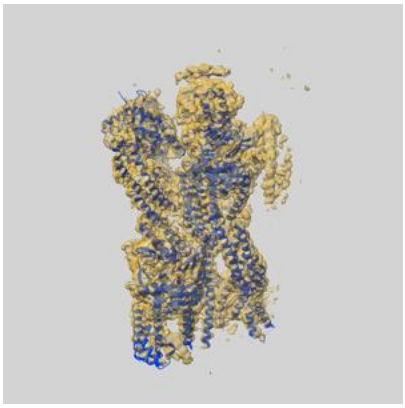
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.90	-	-
Author-provided FSC curve	3.90	4.38	4.02
Unmasked-calculated*	4.19	7.59	4.26

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

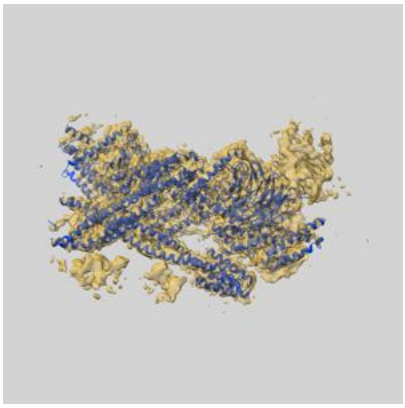
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-17833 and PDB model 8PR3. Per-residue inclusion information can be found in section 3 on page 7.

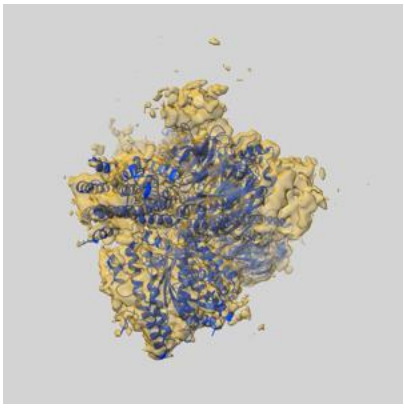
9.1 Map-model overlay



X



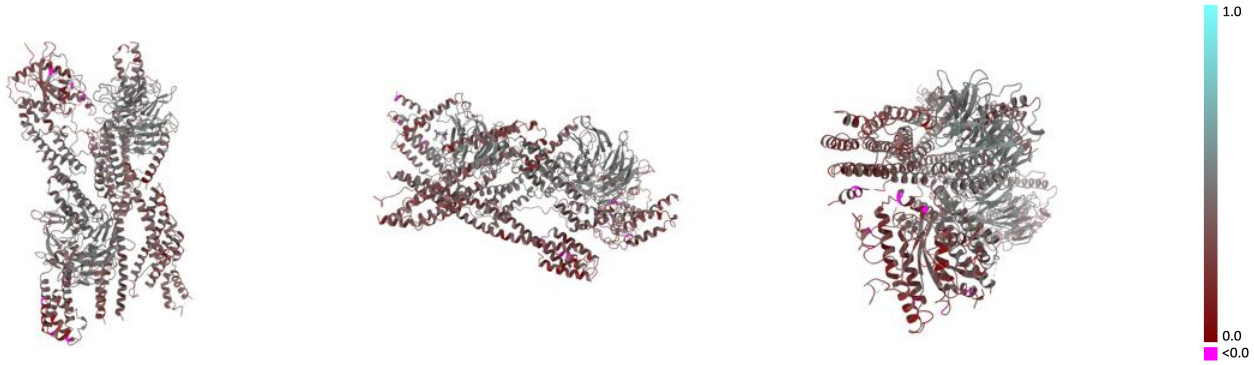
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.004 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.

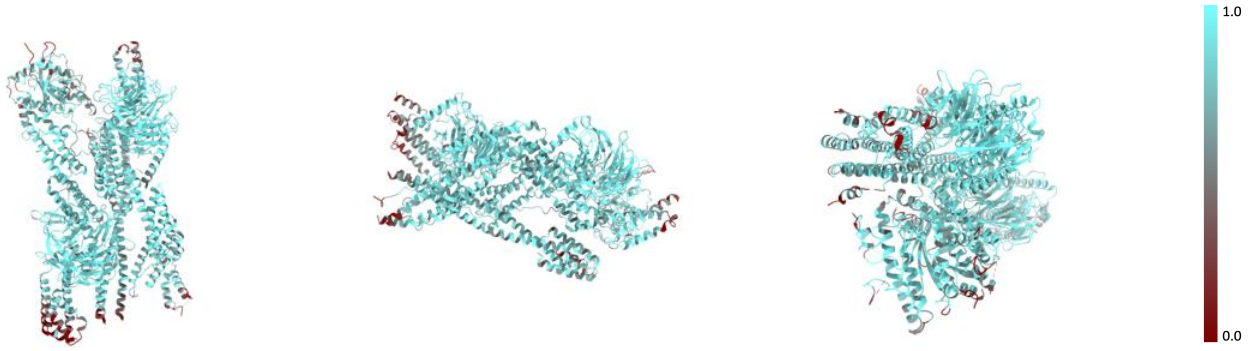
9.2 Q-score mapped to coordinate model (i)



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.

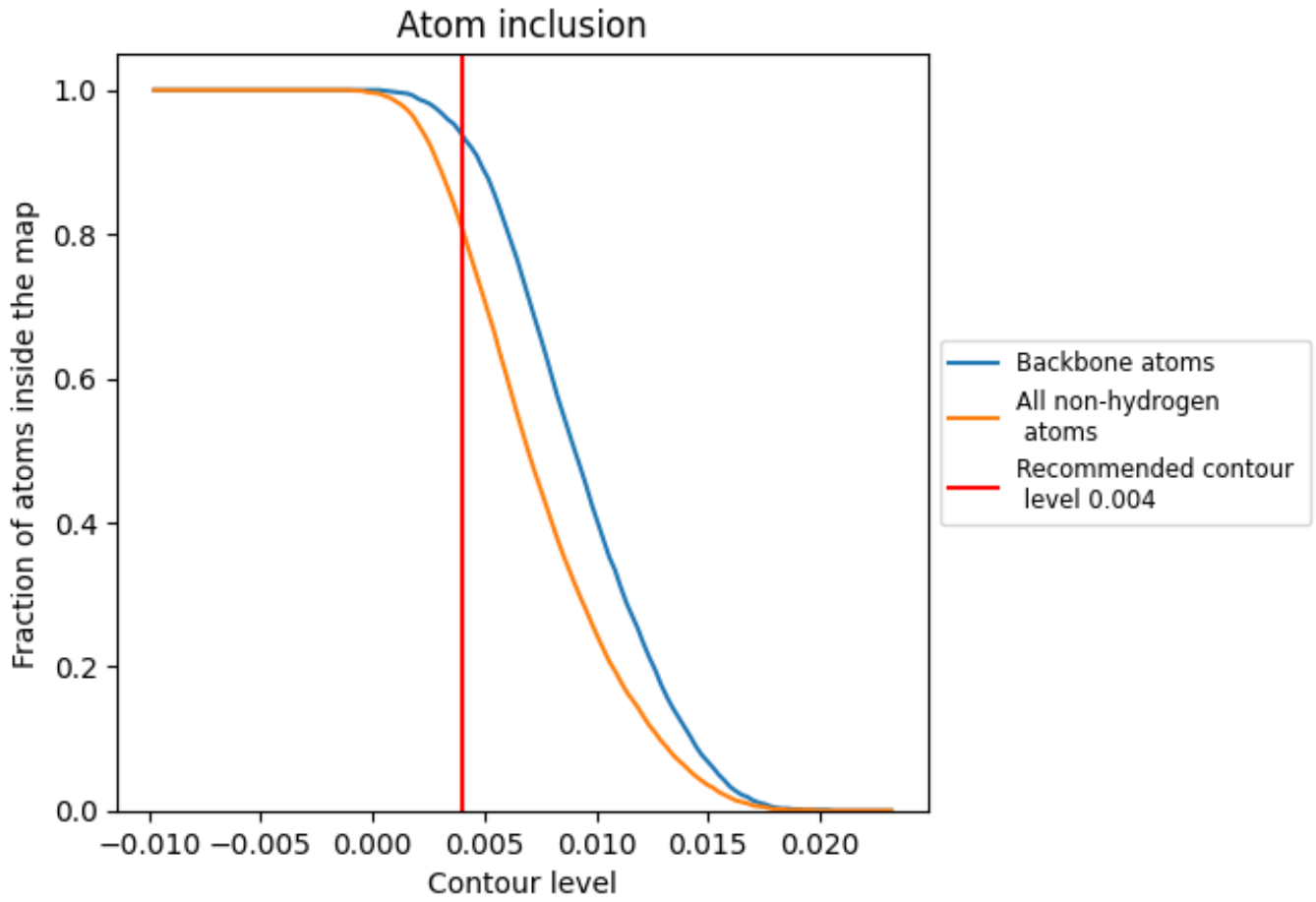
9.3 Atom inclusion mapped to coordinate model (i)



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 (0.004).

9.4 Atom inclusion (i)



At the recommended contour level, 94% of all backbone atoms, 81% 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 (0.004) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8080	0.3810
B	0.7310	0.3200
C	0.7190	0.3170
E	0.4920	0.2580
F	0.3390	0.2010
f	0.7450	0.3840
h	0.9090	0.4490
j	0.7290	0.2850
m	0.8080	0.3670
o	0.9150	0.4550