wwPDB EM Validation Summary Report (i)

Nov 3, 2024 – 11:00 PM EST

PDB ID	:	8DRP
EMDB ID	:	EMD-27680
Title	:	Focus/local refined map in C4 of signal subtracted RyR1 particles
Authors	:	Haji-Ghassemi, O.; Van Petegm, F.
Deposited on	:	2022-07-21
Resolution	:	2.84 Å(reported)

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

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

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

The following versions of software and data (see references (1)) were used in the production of this report:

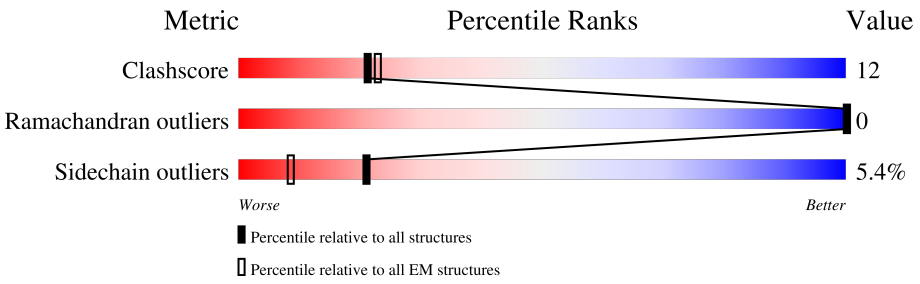
EMDB validation analysis	:	0.0.1.dev113
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.39

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.84 Å.

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



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

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

Mol	Chain	Length	Quality of chain
1	A	5037	8% • 90%
1	B	5037	8% • 90%
1	C	5037	8% • 90%
1	D	5037	8% • 90%

2 Entry composition (i)

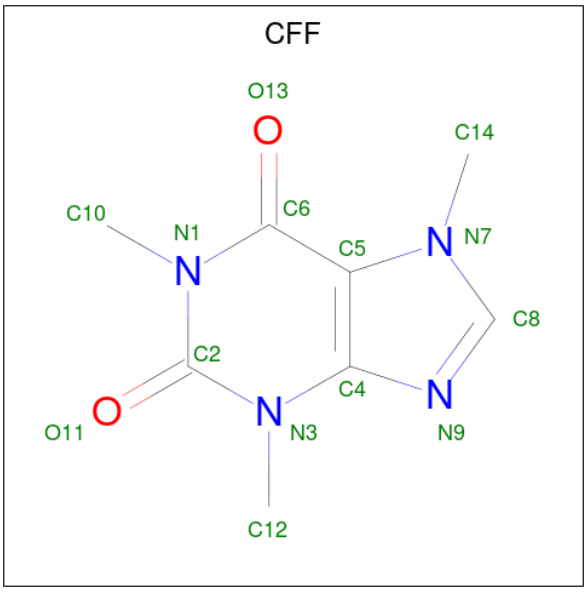
There are 4 unique types of molecules in this entry. The entry contains 15816 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Ryanodine receptor 1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	512	3908	2593	632	657	26	0	0
1	B	512	3908	2593	632	657	26	0	0
1	C	512	3908	2593	632	657	26	0	0
1	D	512	3908	2593	632	657	26	0	0

- Molecule 2 is CAFFEINE (three-letter code: CFF) (formula: $C_8H_{10}N_4O_2$).



Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
2	A	1	14	8	4	2	0
2	B	1	14	8	4	2	0
2	C	1	14	8	4	2	0

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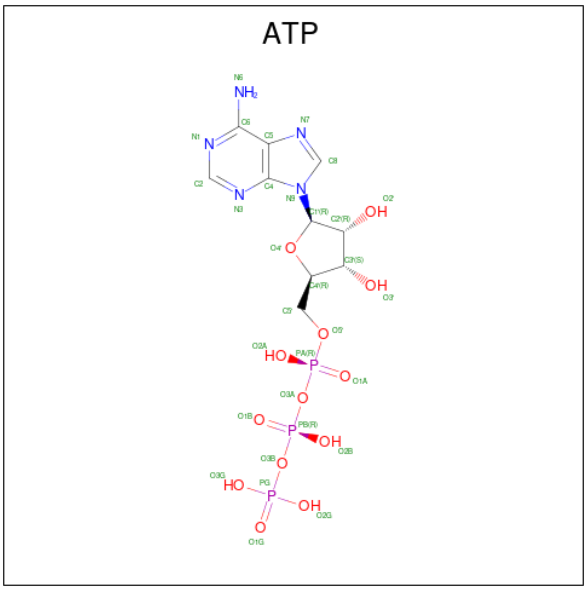
Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
2	D	1	14	8	4	2	0

- Molecule 3 is ADENOSINE-5'-TRIPHOSPHATE (three-letter code: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$).



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

- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

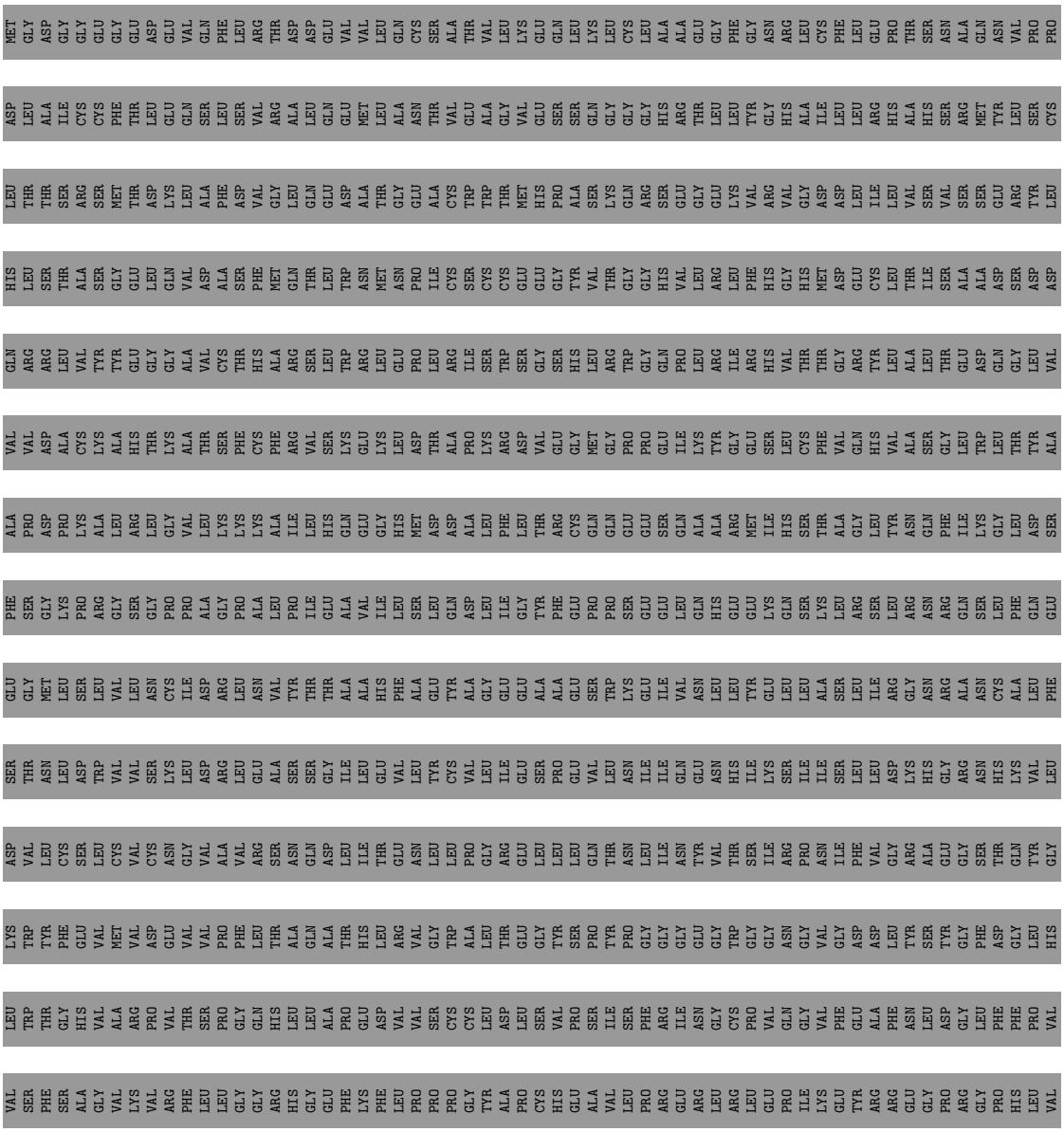
Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
4	A	1	1	1	0
4	B	1	1	1	0
4	C	1	1	1	0
4	D	1	1	1	0

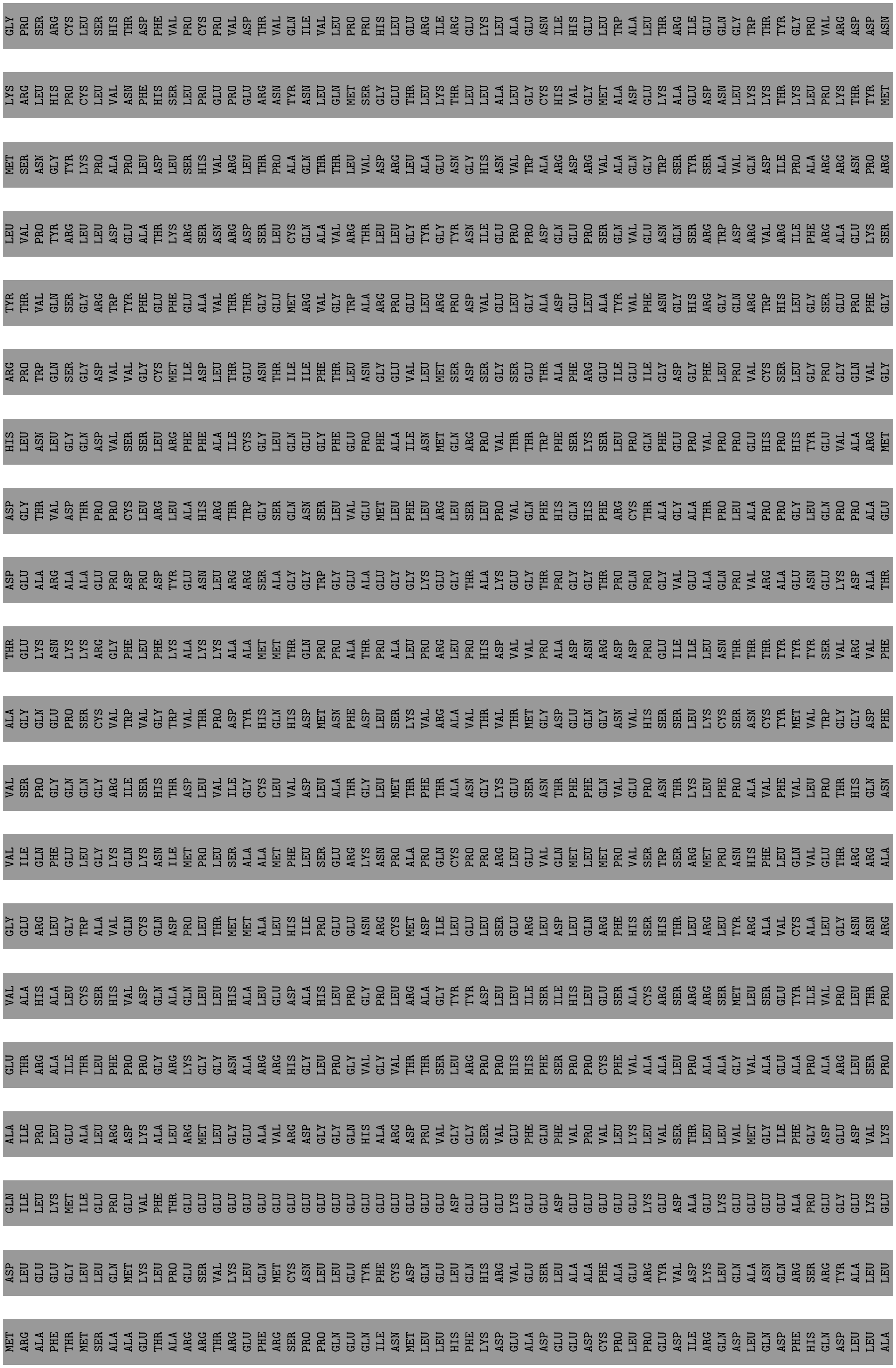
3 Residue-property plots (i)

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

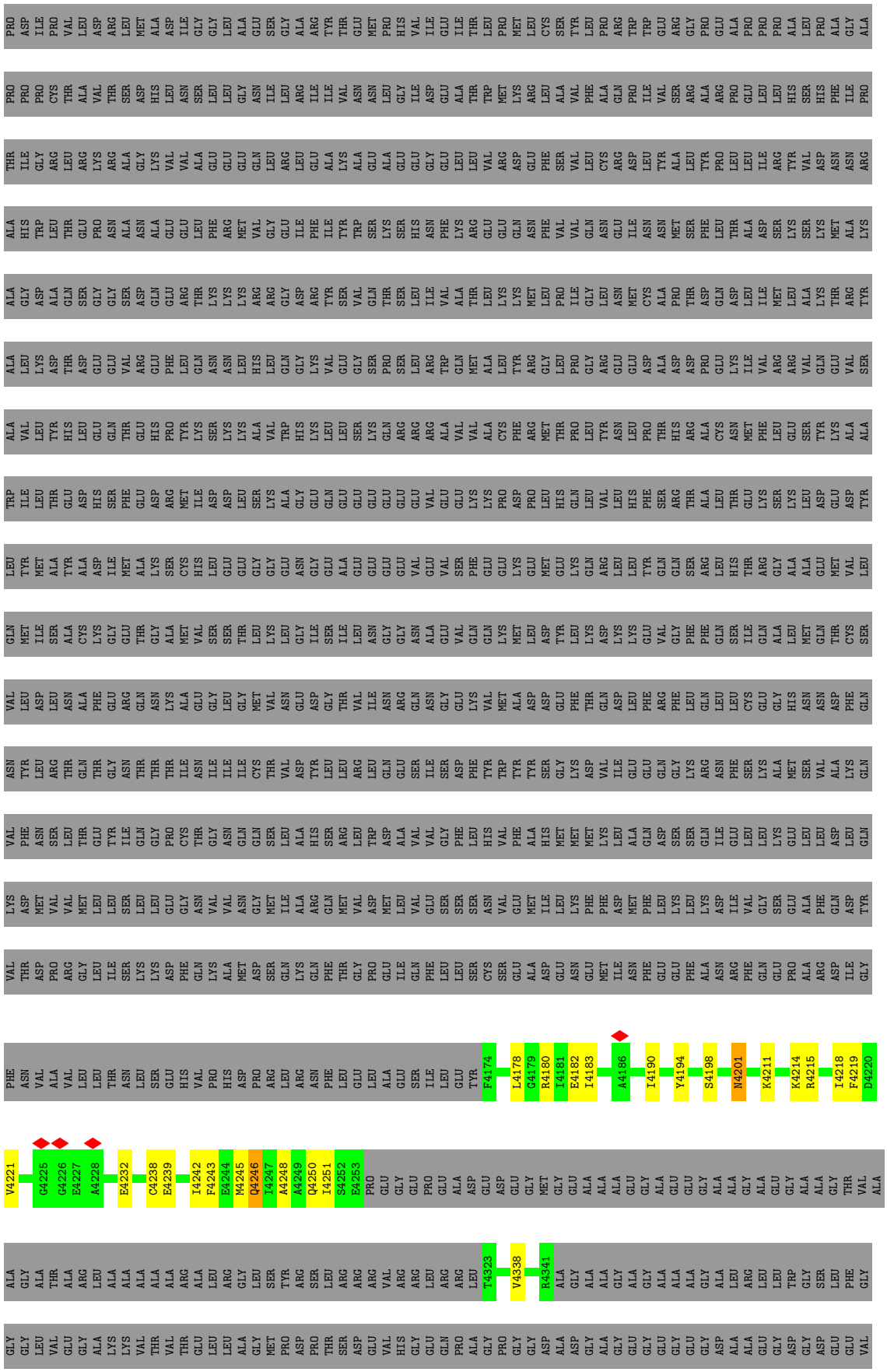
- Molecule 1: Ryanodine receptor 1

Chain A:




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

THR TYR VAL GLU LYS LEU ARG PRO ALA LEU GLY LEU ALA ALA MET PRO VAL ALA PHE LEU GLU PRO GLN LEU ASN GLU TYR ASN ALA CYS SER VAL TYR THR THR LYS SER PRO ARG GLU ARG ALA ILE LEU GLY LEU PRO ASN SER VAL GLU GLU MET CYS
GLN VAL LYS GLY VAL GLY GLN ASN LEU THR TYR THR THR VAL ALA LEU LEU ALA ALA GLN HIS GLN PHE GLY ASP ASP VAL GLN ILE LEU ILE ALA ILE ALA THR LEU PHE GLN HIS ILE LEU ILE THR SER ALA SER GLU ASP VAL SER LEU THR ILE GLY ALA ALA LEU LYS ASN
ALA PRO ALA VAL VAL ASN CYS LEU HIS ILE LEU ALA ARG SER LEU ASP ASP ALA ARG THR VAL MET LYS SER GLY PRO GLU ILE VAL LYS ALA GLY LEU ARG SER ASN LYS SER GLU GLU ASP PHE GLU SER ALA SER GLU GLU ALA ALA ARG THR
ILE LEU LEU PRO LEU ILE ASN GLN TYR PHE THR ASN HIS CYS LEU TYR PHE LEU SER THR PRO ALA LYS VAL LEU GLY SER GLY GLY HIS ALA SER ASN LYS GLU GLU LYS GLU MET ILE THR SER SER LEU PHE CYS LYS LEU ALA ALA LEU VAL ARG HIS GLU
LEU LYS ASP MET GLU LEU ASP THR SER SER ILE GLU LYS ARG PHE ALA PHE GLY PHE LEU GLN LEU LEU ARG TRP MET ASP ILE SER GLN GLU PHE ILE ALA HIS LEU GLU VAL VAL SER SER GLY ARG VAL VAL GLU ILE GLN GLU ALA ALA LYS
ASN TYR HIS ASN THR TRP GLY ARG LYS LYS GLN GLU LEU GLU ALA LYS GLY GLY GLY THR HIS PRO LEU LEU VAL PRO TYR ASP THR LEU THR ALA LYS GLU LYS ALA ARG ASP ARG GLU LYS ALA GLN GLU LEU LEU LYS PHE GLU GLU ILE TYR ARG TRP GLU
TRP THR ILE GLU LYS ALA ARG GLU GLY GLU GLU GLU GLU ARG LYS ILE SER GLN THR ALA GLN THR TYR ASP PRO ARG GLU GLY GLY TYR ASN PRO GLN PRO PRO ASP LEU SER GLY VAL THR LEU SER ARG GLU LEU GLN ALA ALA MET ALA GLU
TYR THR HIS GLU LYS TRP ALA PHE ASP LYS ILE GLN ASN ASN TRP SER TYR GLY GLU ASN ASN VAL ASP GLU GLU LEU LYS THR HIS PRO MET LEU ARG PRO TYR THR THR LYS ASP LYS GLU LYS THR PHE SER GLU LYS ASP LYS GLU ILE TYR ARG TRP PRO ILE LYS GLU SER LEU LYS ALA MET ILE ALA TRP GLU
ASP TYR ASN THR TRP LYS LYS LYS GLN GLU GLU LEU GLU GLU GLY GLY GLY THR HIS PRO LEU LEU VAL PRO TYR ASP THR LEU THR ALA LYS GLU LYS ALA ARG ASP ARG GLU LYS ALA GLN GLU LEU LEU LYS PHE GLU LYS ILE GLN GLU LEU LEU LYS GLY VAL THR LEU SER ARG GLU LEU GLN ALA ALA GLY GLY
LEU LYS ASP MET GLU LEU ASP THR SER SER ILE GLU LYS ARG PHE ALA PHE GLY PHE LEU GLN LEU LEU ARG TRP MET ASP ILE SER GLN GLU PHE ILE ALA HIS LEU GLU VAL VAL SER SER GLY ARG VAL VAL GLU ILE GLN GLU GLU LYS SER PRO HIS GLU GLN GLN GLU LYS PHE PHE ALA LYS
ILE LEU LEU PRO LEU ILE ASN GLN TYR PHE THR ASN HIS CYS LEU TYR PHE LEU SER THR PRO ALA LYS VAL LEU GLY SER GLY GLY HIS ALA SER ASN LYS GLU GLU LYS GLU MET ILE THR SER SER LEU PHE CYS LYS LEU ALA ALA LEU VAL ARG HIS ARG VAL SER LEU PHE GLY THR ASP
ALA PRO ALA VAL VAL ASN CYS LEU HIS ILE LEU ALA ARG SER LEU ASP ASP ALA ARG THR VAL MET LYS SER GLY PRO GLU ILE VAL LYS ALA GLY LEU ARG SER ASN LYS SER GLU GLU ASP PHE PHE GLU SER ALA SER GLU GLU ASP ILE GLU LYS MET VAL GLU ASN LEU LEU ARG LEU GLY LYS VAL SER LEU ILE LYS PHE GLY ALA ARG THR
GLN VAL LYS GLY VAL GLY GLN ASN LEU THR TYR THR THR VAL ALA LEU LEU PRO VAL LEU THR THR LEU PHE GLN HIS ILE ALA GLN HIS GLN PHE GLY ASP ASP VAL GLN VAL SER CYS TYR ARG THR LEU CYS SER ILE LYS GLU LYS ASN
THR TYR VAL GLU LYS LEU ARG PRO ALA LEU GLY LEU ALA ALA MET PRO VAL ALA PHE LEU GLU PRO GLN LEU ASN GLU TYR ASN ALA CYS SER VAL TYR THR THR LYS SER PRO ARG GLU ARG ALA ILE LEU GLY LEU PRO ASN SER VAL GLU GLU MET CYS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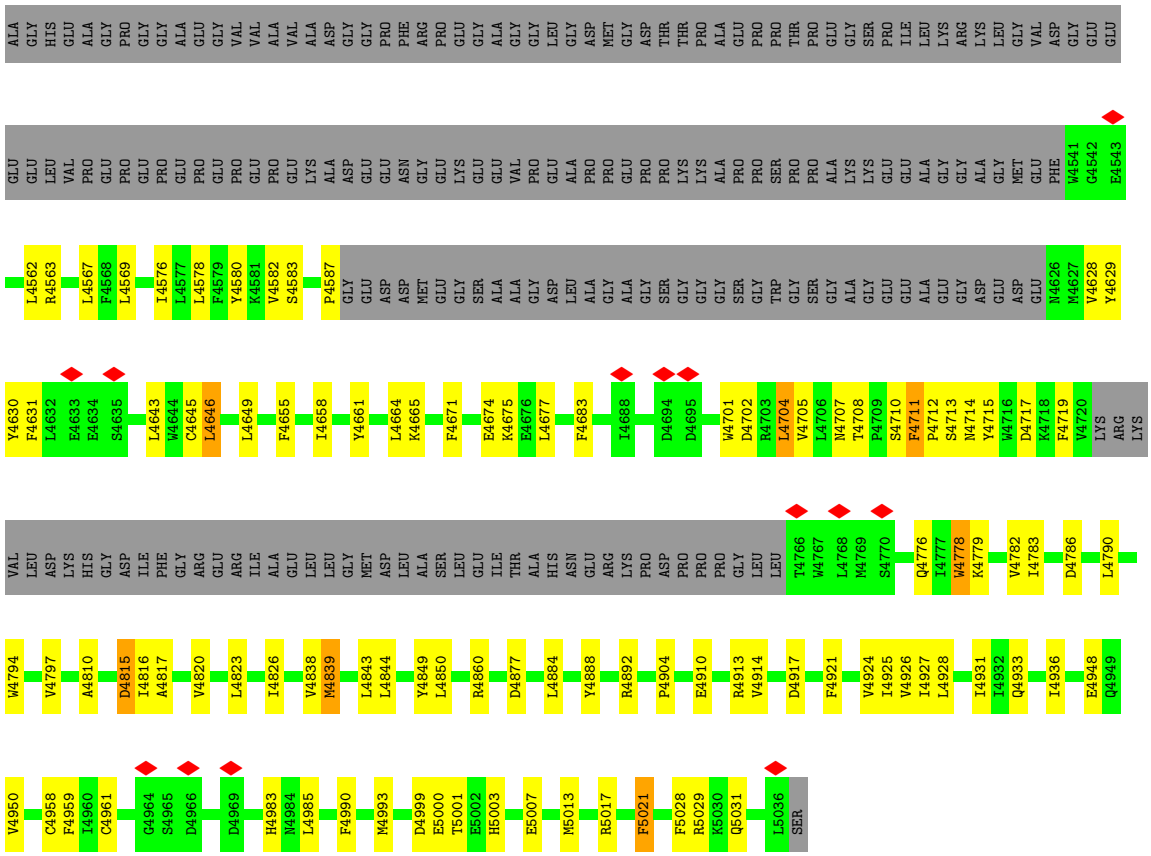
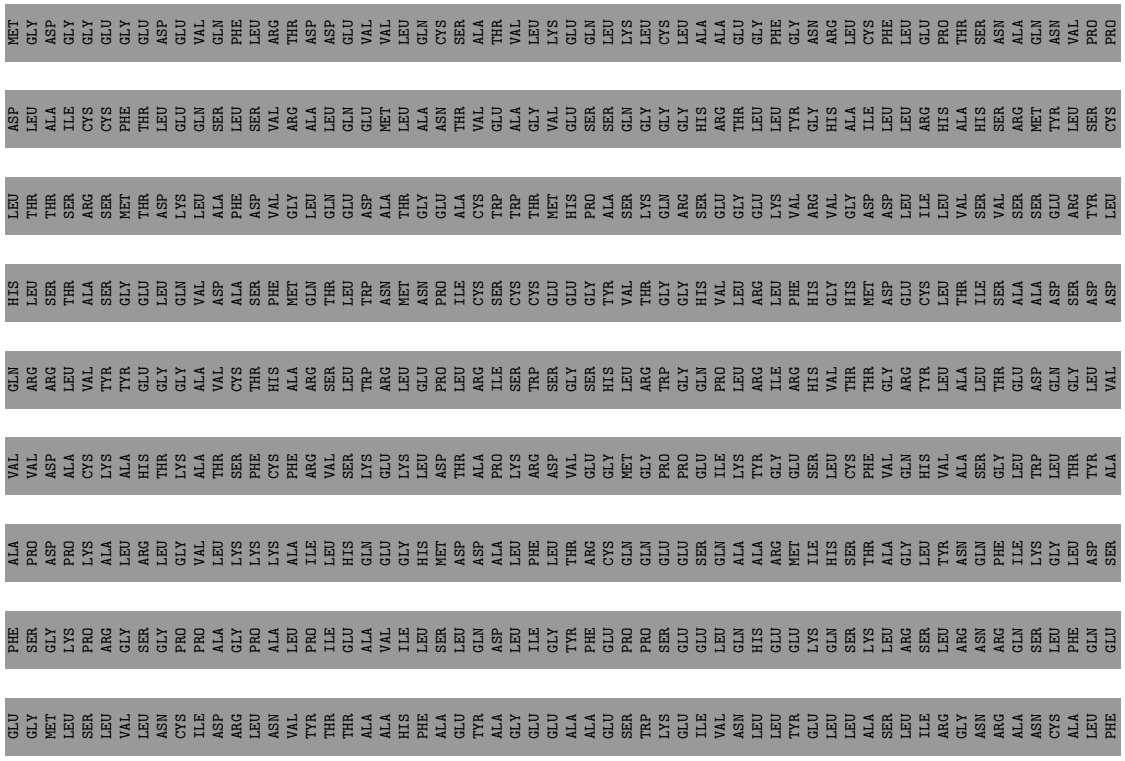
PRO PRO PRO CYS THR ALA VAL THR SER ASP HIS LEU ASN SER LEU LEU GLY ASN ILE ARG ILE ILE VAL ASN LEU GLY ILE ASP GLU ALA THR TRP MET LYS ARG LEU ALA VAL PHE ALA GLN PRO ILE VAL SER ARG ALA ARG PRO GLU LEU LEU HIS SER HIS PHE ILE PRO
THR ILE GLY ARG LEU ARG LYS ARG ALA GLY LYS VAL VAL ALA GLU GLU GLU GLN LEU ARG LEU GLU ILE GLU GLU GLY GLU LEU LEU VAL ARG ASP GLU PHE SER VAL LEU CYS ARG ASP LEU TYR ALA LEU TYR PRO LEU LEU ILE ARG TYR VAL ASP ASN ARG
ALA HIS TRP LEU THR GLU PRO ASN ALA ASN ALA GLU GLU LEU PHE ARG MET VAL GLY GLU ILE PHE TYR TRP SER LYS SER HIS ASN PHE LYS ARG GLU GLU GLN ASN PHE VAL VAL LEU GLN GLU ILE ASN ASN MET SER PHE LEU THR ALA ASP SER LYS SER LYS MET ALA LYS
ALA GLY ASP ALA GLN SER GLY GLY SER ASP GLN GLU ARG ARG GLY ASP ARG TYR SER VAL GLN THR SER SER LEU ILE VAL ALA THR LEU GLN TRP ARG GLU GLU ASN GLU ILE ASN MET CYS ALA PRO THR ASP PRO GLU LYS VAL ARG ARG GLU ILE LEU PRO ILE GLY LEU ASN MET THR ASP ASP ILE LEU THR ASP GLN ASP LEU VAL ALA ARG TYR
ALA LEU LYS ASP THR ASP GLU GLU VAL GLN THR GLU HIS PRO TYR LYS SER LYS LYS LEU HIS LEU GLU GLN GLN GLY LYS VAL GLU GLY SER PRO SER LEU ARG TRP GLN MET ALA LEU LYS VAL LEU PRO GLY GLY LEU PRO GLU LYS ILE LEU ILE MET LEU ARG GLU GLU ARG ARG VAL GLU LYS THR ARG TYR
ALA VAL LEU TYR HIS LEU GLU GLN THR GLU HIS PRO TYR LYS SER LYS LYS ALA VAL TRP HIS LYS LEU LEU SER LYS GLN ARG ARG ALA VAL VAL ALA CYS PHE ARG MET THR PRO LEU LEU TYR ASN LEU PRO THR HIS ARG ALA CYS ASN MET ALA ALA
TRP ILE LEU THR GLU ASP HIS SER PHE GLU ASP ARG MET ILE ASP ASP LEU SER LYS ALA GLY GLU GLN GLU GLU GLU GLU GLU GLU VAL GLU GLU LYS LYS PRO ASP PRO LEU HIS GLN LEU LEU VAL LEU HIS PHE SER ARG THR ALA LEU THR GLU LYS SER LYS LEU ASP GLU GLU
LEU TYR MET ALA TYR ALA ASP ILE MET ALA LYS SER CYS HIS LEU GLU GLU GLU GLY GLY GLU ASN GLY GLU GLU GLU GLU GLU VAL GLU VAL SER PHE GLU GLU LYS GLU MET GLU LYS GLN ARG LEU LEU TYR GLN GLN SER ARG LEU HIS THR ARG GLY ALA ALA ALA GLU MET VAL LEU
GLN MET ILE SER ALA CYS LYS GLY GLU THR GLY ALA MET VAL SER SER THR LEU LYS LEU GLY ILE SER ILE LEU ASN GLY GLY ASN ALA GLU VAL GLN GLN LYS MET LEU ASP TYR LEU LYS ASP LYS LYS GLU VAL GLY PHE PHE GLN SER ILE GLN ALA LEU MET GLN THR CYS SER
VAL LEU ASP LEU ASN ALA PHE GLU ARG GLN ASN LYS ALA GLU GLY LEU GLY MET VAL ASN GLU ASP GLY THR VAL ILE ASN ARG GLN ASN GLY GLU LYS VAL GLU GLU ASP PHE PHE THR GLN ASP LEU PHE ARG PHE LEU GLN GLN LEU LEU THR CYS GLU GLU GLY HIS PHE GLN
ASN TYR LEU ARG THR GLN THR GLY ASN THR THR GLY THR THR ILE ASN ILE ILE ILE CYS THR VAL ASP TYR LEU LEU ARG LEU LEU GLN GLU ILE SER ASP PHE TYR TRP TYR TYR SER GLY LYS ASP VAL ILE GLU GLU GLU GLN GLY GLY LYS VAL GLN ARG LEU LEU ILE ALA LYS LYS GLN
VAL PHE ASN SER SER LEU THR GLU TYR ILE GLN GLY PRO CYS THR GLY ASN GLN GLN GLN SER LEU LEU ALA HIS SER ARG LEU TRP ASP ALA VAL VAL GLY PHE LEU HIS VAL PHE ALA HIS MET MET MET LYS LEU ALA GLN ASP SER SER GLN GLN LEU LEU LYS GLN
LYS ASP MET VAL VAL MET LEU LEU SER LEU LEU GLU GLU VAL ASP MET VAL ASN GLY MET ILE ALA ARG GLN MET VAL GLU SER SER SER ASN VAL GLU MET ILE LEU LYS PHE PHE ASP MET MET PHE LEU LYS LEU LYS GLN LYS LYS LYS
VAL THR ASP PRO ARG GLY LEU ILE SER LYS LYS ASP PHE GLN ASN VAL ALA ASP SER GLN GLN LYS GLN PHE THR GLY PRO GLU ILE LEU PHE LEU LEU SER CYS SER GLU ALA ASP GLU ASN GLU MET ILE ASN PHE GLU ALA ARG ASP ILE GLU GLY
PHE ASN VAL ALA VAL LEU LEU THR ASN LEU LEU GLU HIS VAL PRO HIS ASP PRO ARG LEU LEU ALA ASN ASN PHE LEU GLU GLU PRO LEU ALA GLU SER ILE LEU GLU TYR F4174 L4178 G4179 R4180 I4181 E4182 I4183 A4186 I4190 Y4194 S4198 N4201 K4211 K4214 R4215 I4218 F4219 D4220
V4221 G4225 G4226 E4227 A4228 E4232 C4238 E4239 I4242 F4243 E4244 M4245 Q4246 T4247 A4248 A4249 Q4250 I4251 S4252 E4253 PRO GLU GLY GLU PRO GLU ALA ASP GLU ASP GLU GLY MET GLY GLU ALA ALA ALA GLU GLU GLY ALA ALA ALA GLU GLU GLY ALA ALA GLU GLU GLY ALA ALA GLY THR VAL ALA
ALA GLY ALA THR ALA ARG LEU ALA ALA ARG ALA LEU ARG GLY LEU SER TYR ARG SER LEU ARG ARG ARG VAL ARG ARG LEU ARG ARG LEU T4323 V4338 R4341 ALA GLY ALA ALA GLY ALA GLY ALA ALA ALA GLU LEU LEU LEU TRP GLY SER LEU PHE GLY
GLY GLY LEU VAL GLU GLY ALA LYS LYS VAL THR VAL THR GLU LEU LEU ALA GLY MET PRO ASP PRO THR SER ASP GLU VAL HIS GLY GLU GLN PRO ALA GLY PRO GLY GLY ASP ALA ASP GLY ALA GLY GLU GLY GLU GLU GLY GLU GLY GLY ASP ALA ALA GLU GLY ASP GLY ASP GLU GLU VAL



• Molecule 1: Ryanodine receptor 1

Chain B: 8% 90%



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

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

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

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

VAL SER PHE SER ALA GLY VAL LYS VAL ARG PHE LEU LEU GLY GLY ARG HIS GLY GLU PHE LYS PHE LEU PRO PRO PRO GLY TYR ALA PRO CYS HIS GLU ALA VAL LEU PRO ARG GLU ARG LEU ARG LEU GLU PRO ILE LYS GLU TYR ARG ARG GLU GLY PRO ARG GLY PRO HIS LEU VAL

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

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

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

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

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

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

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

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

ASP GLU ALA ARG ALA ALA GLU PRO ASP PRO ASP TYR GLU ASN LEU ARG ARG SER ALA GLY GLY TRP GLY GLU ALA GLU GLY GLY LYS GLU GLY THR ALA LYS GLU GLY THR PRO GLY GLY THR PRO GLN PRO GLY VAL GLU ALA GLN PRO VAL ARG ALA GLU ASN GLU LYS ASP ALA THR

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

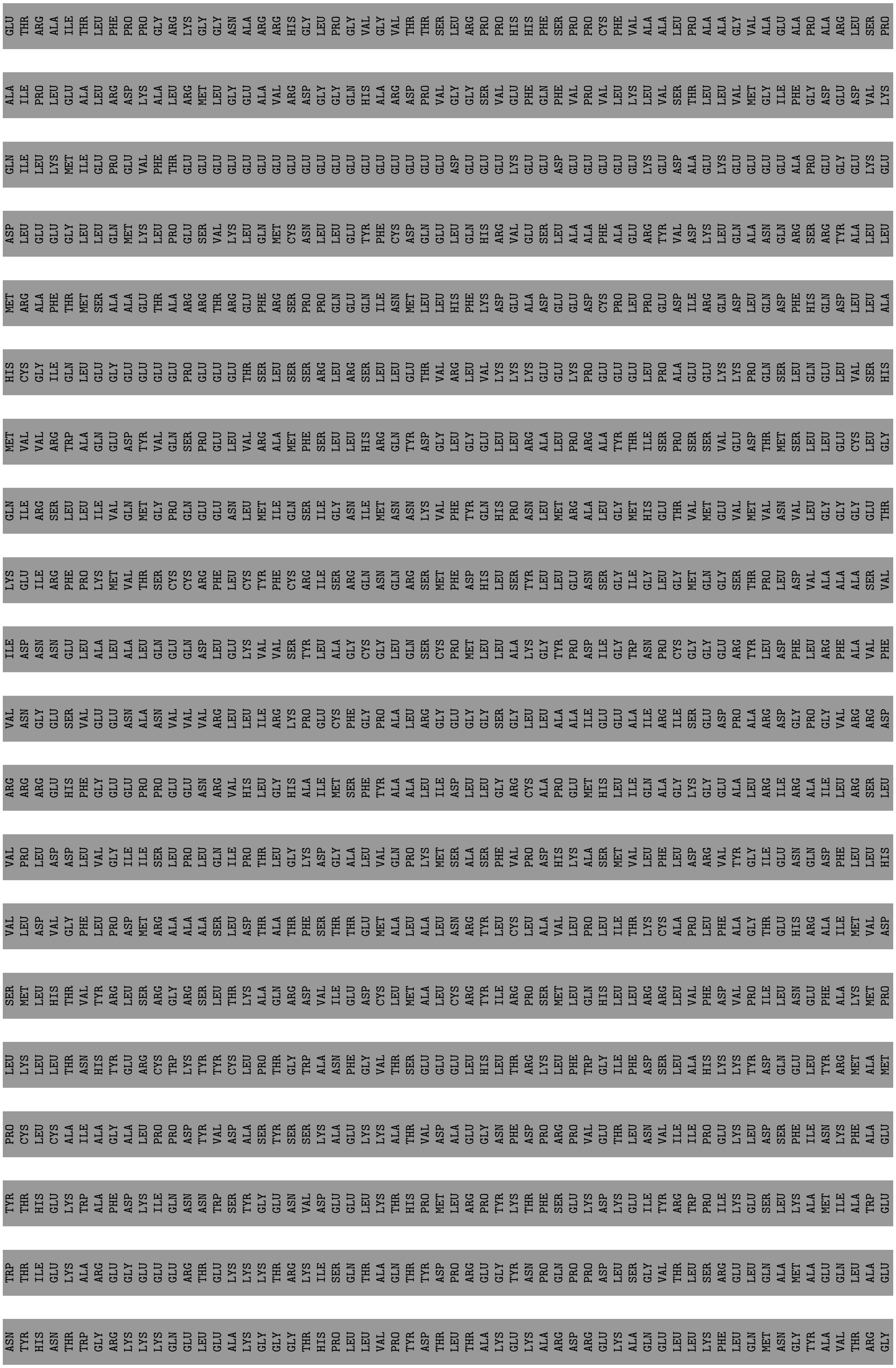
ALA GLY GLN GLU PRO SER CYS VAL TRP VAL GLY TRP VAL THR PRO ASP TYR HIS GLN HIS ASP MET ASN PHE ASP LEU SER LYS VAL ARG ALA VAL THR VAL THR MET GLY ASP GLU GLN GLY ASN VAL HIS SER SER LEU LYS CYS SER ASN CYS TYR MET VAL TRP GLY GLY ASP PHE

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

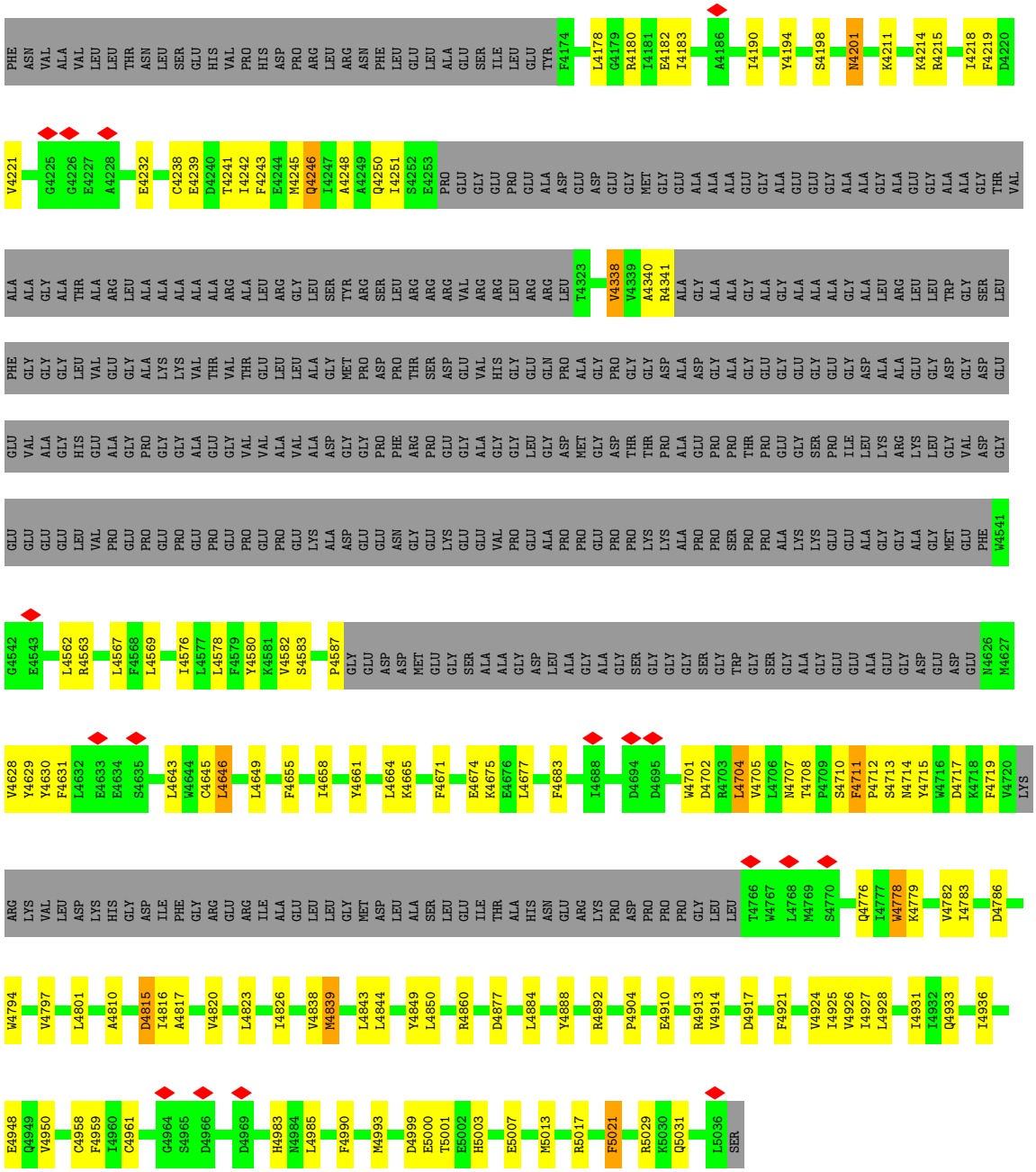
VAL ILE GLN PHE GLU LEU GLY LYS GLN LYS ASN ILE MET PRO LEU SER ALA ALA MET PHE LEU SER GLU ARG LYS ASN PRO ALA PRO GLN CYS PRO PRO ARG LEU GLU VAL GLN MET LEU MET PRO VAL SER TRP SER ARG MET PRO ASN HIS PHE LEU GLN VAL GLU THR ARG ARG ALA

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

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

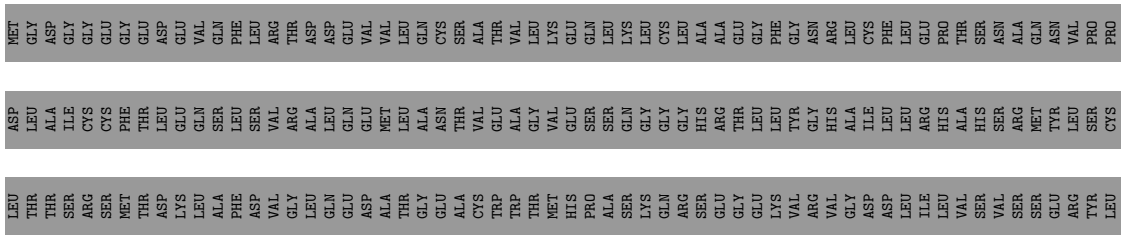

GLU THR ARG ALA ILE THR LEU PHE PRO PRO GLY ARG LYS GLY GLY ASN ALA ARG ARG HIS GLY LEU PRO GLY VAL GLY VAL THR THR SER LEU ARG PRO PRO HIS HIS PHE SER PRO PRO CYS PHE VAL ALA ALA LEU PRO ALA ALA GLY VAL ALA GLU ALA PRO ALA ARG LEU SER PRO
ALA ILE PRO LEU GLU ALA LEU ARG ASP LYS ALA LEU ARG MET LEU GLY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

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



- Molecule 1: Ryanodine receptor 1

Chain C: 8% 90%



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

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

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

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

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

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

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

GLU THR ARG ALA ILE THR LEU PHE PRO PRO GLY ARG LYS GLY GLY ASN ALA ARG ARG HIS GLY LEU PRO GLY VAL GLY VAL THR THR SER LEU ARG PRO PRO HIS HIS PHE SER PRO PRO CYS PHE VAL ALA ALA LEU PRO ALA ALA GLY VAL ALA GLU ALA PRO ALA ARG LEU SER PRO

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

GLN ILE LEU LYS MET ILE GLU PRO GLU VAL PHE THR GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU ASP GLU GLU LYS GLU GLU ASP GLU GLU GLU GLU LYS GLU ASP ALA GLU LYS GLU GLU GLU ALA PRO GLU GLY GLU LYS GLU

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

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

HIS CYS GLY ILE GLN LEU GLU GLY GLU GLU GLU PRO GLU GLU GLU THR SER LEU SER SER ARG LEU ARG SER LEU LEU GLU THR VAL ARG LEU VAL LYS LYS LYS GLU GLU LYS PRO GLU GLU GLU LEU PRO ALA GLU GLU LYS LYS PRO GLN SER LEU GLN GLU LEU VAL SER HIS

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

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

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

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

VAL ASN GLY GLU SER VAL GLU GLU ASN ALA ASN VAL VAL VAL ARG LEU LEU ILE ARG LYS PRO GLU CYS PHE GLY PRO ALA LEU ARG GLY GLU GLY GLY SER GLY LEU LEU ALA ALA ILE GLU GLU ALA ILE ARG ILE SER GLU ASP PRO ALA ARG ASP GLY PRO GLY VAL ARG ARG ASP

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

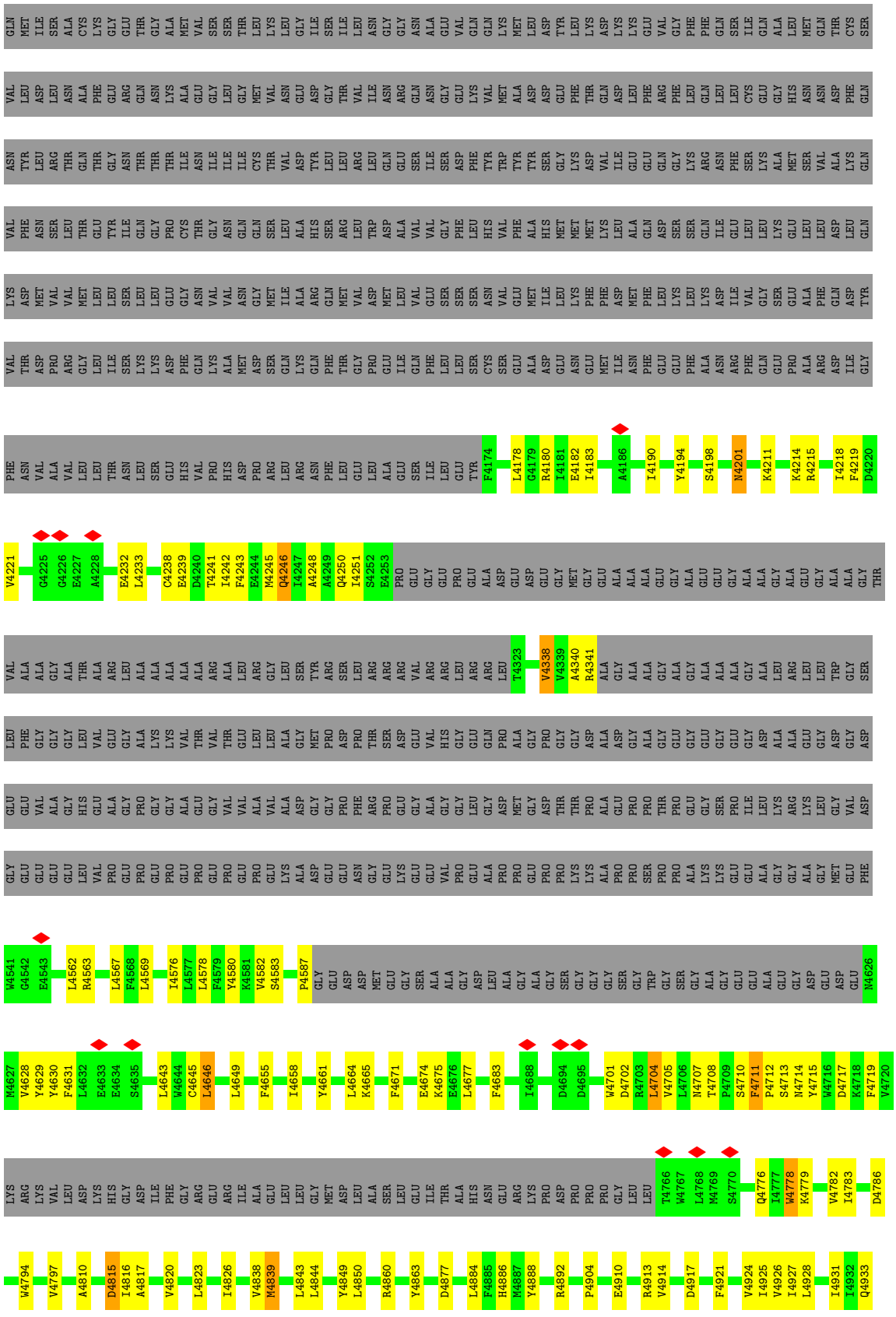
ALA GLY ASP ALA GLN SER GLY GLY SER ASP GLN GLU ARG THR LYS LYS LYS ARG ARG GLY ASP ARG TYR SER VAL GLN THR SER LEU ILE VAL ALA THR LEU LYS LYS MET LEU PRO ILE GLY LEU ASN MET CYS ALA PRO THR ASP GLN ASP LEU ILE MET LEU ALA LYS THR ARG TYR

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

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

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

LEU TYR MET ALA TYR ALA ASP ILE MET ALA LYS SER CYS HIS LEU GLU GLU GLY GLY GLU ASN GLY GLU ALA GLU GLU GLU GLU VAL GLU VAL SER PHE GLU GLU LYS GLU MET GLU LYS GLN ARG LEU LEU TYR GLN GLN SER ARG LEU HIS THR ARG GLY ALA ALA GLU MET VAL LEU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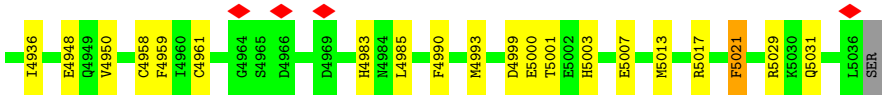
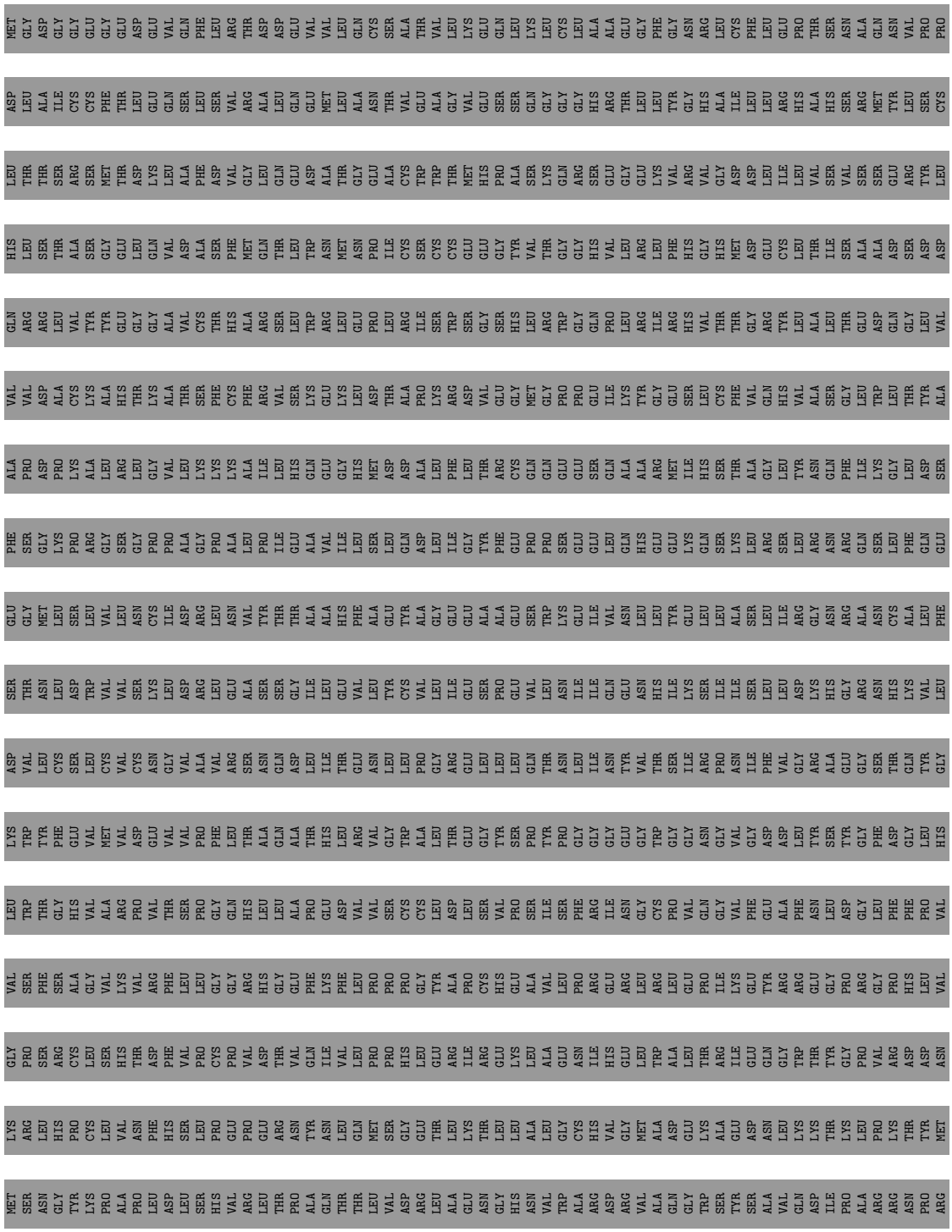
I4927
L4928
I4931
I4932
Q4933
LYS ARG LYS VAL LEU ASP LYS HIS GLY ASP ILE PHE GLY ARG GLU ARG ILE ALA GLU LEU LEU GLY MET ASP LEU ALA SER LEU GLU ILE THR ALA HIS ASN GLU ARG LYS PRO ASP PRO PRO PRO GLY LEU LEU
T4766 W4767 L4768 M4769 S4770 Q4776 I4777 W4778 K4779 V4732 I4783 D4786
M4627 V4628 Y4629 Y4630 F4631 L4632 E4633 E4634 S4635 L4643 W4644 C4645 L4646 L4649 F4655 I4658 Y4661 L4664 K4665 F4671 E4674 K4675 E4676 L4677 F4683 I4688 D4694 D4695 W4701 D4702 R4703 L4704 V4705 L4706 N4707 T4708 P4709 S4710 F4711 P4712 S4713 N4714 Y4715 W4716 D4717 K4718 F4719 V4720
W4541 G4542 E4543 L4562 R4563 L4567 F4568 L4569 I4576 L4577 L4578 F4579 Y4580 K4581 V4582 S4583 P4587 GLY GLU ASP ASP MET GLU GLY SER ALA ALA GLY ASP LEU ALA GLY ALA GLY SER GLY GLY GLY SER GLY TRP GLY SER GLY GLU GLU ALA GLY GLY ALA ASP GLU GLY M4626
GLY GLU GLU GLU LEU VAL PRO GLU PRO PRO PRO GLU PRO GLU PRO GLU VAL ALA ASP GLY GLY PRO PHE ARG PRO GLU GLY ALA GLU GLU LYS ALA ASP GLY GLU GLU GLU ALA VAL PRO GLU ALA PRO PRO PRO PRO LYS LYS ALA PRO PRO PRO SER PRO PRO ALA LYS LYS GLU GLU ALA GLY GLY ALA GLY MET GLU PHE
GLU GLU VAL ALA GLY HIS GLU ALA GLY PRO GLY GLY ALA GLU GLY VAL VAL ALA ALA LEU GLU ARG GLY ASP MET GLY ASP THR THR PRO ALA ALA GLU PRO GLY PRO PRO THR PRO GLU GLY SER PRO ILE LEU LYS LYS ARG LYS LEU GLY VAL ASP
LEU PHE GLY GLY GLY LEU VAL GLU GLY ALA LYS LYS VAL THR VAL THR GLU LEU LEU ALA GLY MET PRO ASP PRO THR SER ASP GLU VAL HIS GLY GLU GLN PRO ALA GLY PRO GLY GLY ASP ALA ASP GLY ALA GLU GLU GLU GLU GLU GLY ALA ALA ALA GLU GLU GLY GLY ASP
VAL ALA ALA GLY ALA THR ALA ARG LEU ALA ALA ALA ALA ARG ALA LEU ARG GLY LEU SER TYR ARG SER LEU ARG ARG ARG ARG VAL ARG ARG LEU ARG ARG LEU T4323 V4338 V4339 A4340 R4341 ALA GLY ALA ALA ALA GLY ALA GLY ALA ALA ALA ALA GLY ALA ALA GLY LEU LEU LEU TRP GLY SER
PHE ASN VAL ALA VAL LEU LEU THR ASN LEU SER GLU HIS VAL PRO HIS ASP PRO ARG LEU ARG ASN PHE LEU GLU LEU ALA GLU SER ILE LEU GLU TYR F4174 L4178 G4179 R4180 I4181 E4182 I4183 A4186 I4190 Y4194 S4198 N4201 K4211 K4214 R4215 I4218 F4219 D4220
V4221 G4225 G4226 E4227 A4228 E4232 L4233 C4238 E4239 D4240 T4241 I4242 F4243 E4244 M4245 Q4246 I4247 A4248 A4249 Q4250 I4251 S4252 E4253 PRO GLU GLY GLU PRO GLU ALA ASP GLU ASP GLU GLY MET GLY GLU ALA ALA ALA ALA GLU GLU GLY ALA GLU GLU GLY ALA ALA ALA GLY ALA ALA GLU GLU GLY ALA ALA GLU GLY THR
VAL THR ASP PRO ARG GLY LEU ILE SER LYS LYS ASP PHE GLN LYS ALA MET ASP SER GLN LYS GLN PHE THR GLY PRO GLU ILE GLN PHE LEU LEU SER CYS SER GLU ALA ASP GLU ASN GLU MET ILE ASN PHE GLU GLU PHE GLN GLU PRO ALA ARG ARG PHE GLN GLN ASP ILE GLY
LYS ASP MET VAL VAL MET LEU LEU SER LEU LEU GLU GLY ASN VAL VAL ASN GLY MET ILE ALA ARG GLN MET VAL ASP MET LEU VAL GLU SER SER SER ASN VAL GLU MET ILE LEU LYS PHE PHE ASP MET PHE LEU LYS LEU LYS ASP ILE VAL GLY SER GLU ALA PHE GLN ASP TYR
VAL PHE ASN SER LEU THR GLU TYR ILE GLN GLN PRO CYS THR GLY ASN ILE ALA HIS SER ARG LEU TRP ASP ALA VAL VAL GLY PHE LEU HIS VAL PHE ALA HIS MET MET MET LYS LEU ALA GLN ASP SER SER GLN ILE GLU LEU LEU LYS GLU LEU LEU ASP VAL LEU GLN
ASN TYR LEU ARG THR GLN THR GLY ASN THR THR THR ILE ASN ILE ILE ILE CYS THR VAL ASP TYR LEU LEU ARG LEU GLN GLU SER ILE SER ASP PHE TYR TRP TYR TYR SER GLY LYS ASP VAL ILE GLU GLU GLN GLY LYS ARG ASN PHE SER LYS ALA MET SER VAL ALA GLN
VAL LEU ASP LEU ASN ALA PHE GLU ARG GLN LYS ASN GLU ALA GLU GLY LEU GLY MET VAL ASN GLU ASP GLY THR VAL ILE ASN ARG GLN ASN GLY GLU GLU LYS VAL MET ALA ASP ASP GLU PHE THR GLN ASP LEU PHE ARG PHE LEU GLN LEU LEU CYS GLU GLU GLY HIS ASN ASN PHE GLN
GLN MET ILE SER ALA CYS LYS GLY GLU THR GLY ALA MET VAL SER SER THR LEU LYS LEU GLY ILE SER ILE LEU LEU ASN GLY GLY ASN ALA GLU VAL GLY PHE PHE GLN SER ILE GLN GLN ALA LEU MET GLN THR CYS SER



- Molecule 1: Ryanodine receptor 1

Chain D: 8% 90%



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

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

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

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

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

ASP GLU ALA ARG ALA ALA GLU PRO ASP PRO ASP TYR GLU ASN LEU ARG ARG SER ALA GLY GLY TRP GLY GLU ALA GLU GLY GLY LYS GLU GLY THR ALA LYS GLU GLY THR PRO GLY GLY THR PRO GLN PRO GLY VAL GLU ALA GLN PRO VAL ARG ALA GLU ASN GLU LYS ASP ALA THR

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

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

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

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

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

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

GLU THR ARG ALA ILE THR LEU PHE PRO PRO GLY ARG LYS GLY GLY ASN ALA ARG ARG HIS GLY LEU PRO GLY VAL GLY VAL THR THR SER LEU ARG PRO PRO HIS HIS PHE SER PRO PRO CYS PHE VAL ALA ALA LEU PRO ALA ALA GLY VAL ALA GLU ALA PRO ALA ARG LEU SER PRO

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

GLN ILE LEU LYS MET ILE GLU PRO GLU VAL PHE THR GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU GLU ASP GLU GLU GLU LYS GLU GLU ASP GLU GLU GLU GLU GLU LYS GLU ASP ALA GLU LYS GLU GLU GLU GLU ALA PRO GLU GLY GLU LYS GLU

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

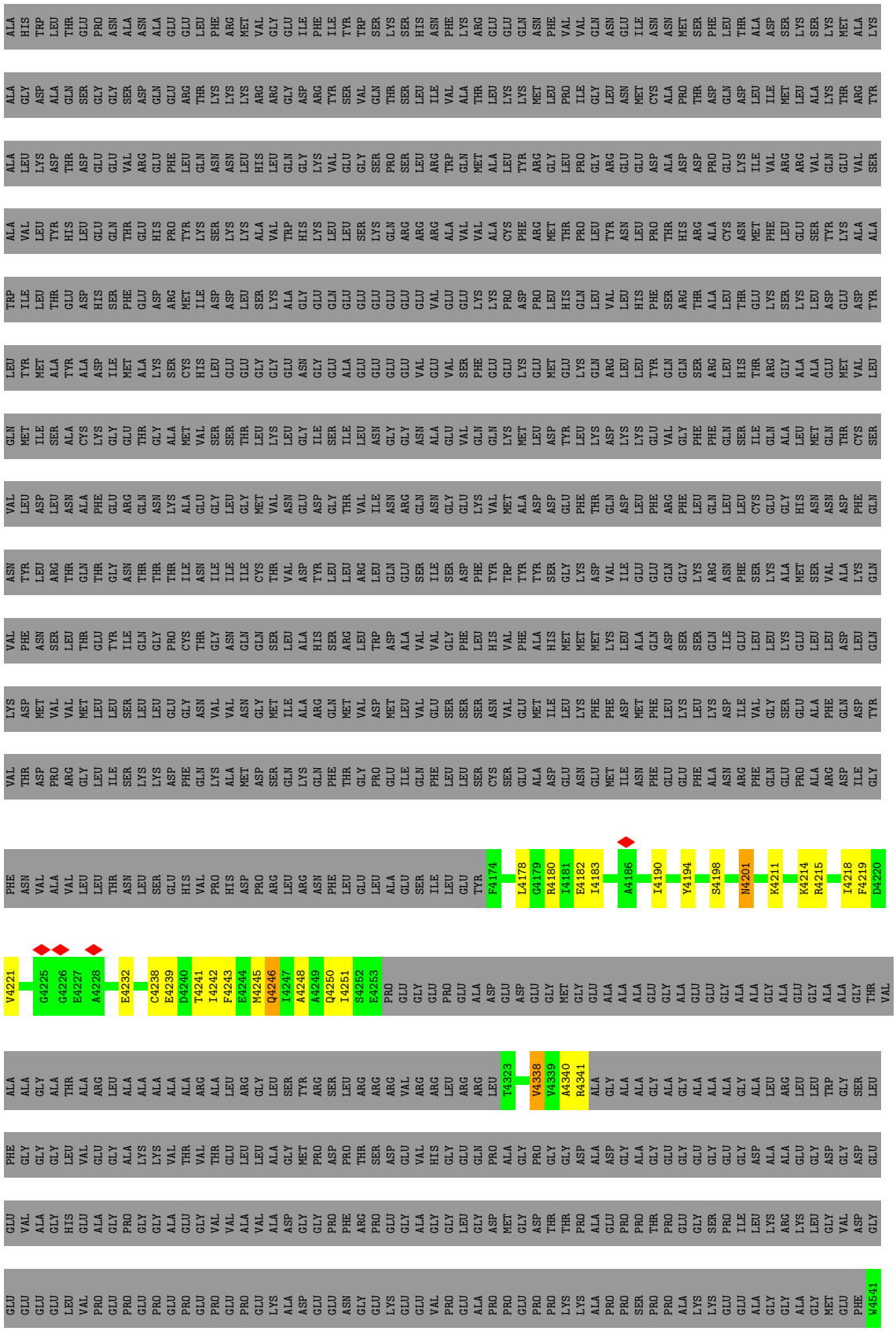
MET ARG ALA PHE THR MET SER ALA ALA GLU THR ALA ARG ARG THR ARG GLU PHE ARG SER PRO PRO GLN GLU GLN ILE ASN MET LEU LEU HIS PHE LYS ASP GLU ALA ASP GLU GLU ASP CYS PRO LEU PRO GLU ASP ILE ARG GLN ASP LEU GLN ASP PHE HIS GLN ASP LEU LEU ALA

HIS CYS GLY ILE GLN LEU GLU GLY GLU GLU GLU PRO GLU GLU GLU THR SER LEU SER SER ARG LEU ARG SER LEU LEU GLU THR VAL ARG LEU VAL LYS LYS LYS GLU GLU LYS PRO GLU GLU GLU LEU PRO ALA GLU GLU LYS LYS PRO GLN SER LEU GLN GLU LEU VAL SER HIS

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

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

LYS GLU ILE ARG PHE PRO LYS MET VAL THR SER CYS CYS ARG PHE LEU LEU CYS TYR PHE CYS ARG ILE SER ARG GLN ASN GLN ARG SER MET PHE ASP HIS LEU SER TYR LEU LEU GLU ASN SER GLY ILE GLY LEU GLY MET GLN GLY SER THR PRO LEU ASP VAL ALA ALA ARG ASP
ILE ASP ASN ASN GLU LEU ALA LEU LEU GLN GLU GLN ASP LEU GLU LYS VAL VAL SER TYR LEU ALA GLY CYS GLY LEU GLN SER CYS PRO MET LEU LEU ALA LYS GLY TYR PRO ASP ILE GLY TRP ASN PRO CYS GLY GLY GLU ARG TYR LEU ASP PHE LEU ARG ALA ALA VAL PHE
VAL ASN GLY GLU SER VAL GLU GLU ASN ALA ASN VAL VAL ARG LEU LEU ILE ARG LYS PRO GLU CYS PHE GLY PRO ALA LEU ARG GLY GLU GLY GLY SER GLY LEU LEU ALA ALA ILE ILE GLU GLU ILE ARG ILE SER GLU ASP PRO ALA ARG ASP GLY PRO GLY VAL ARG ARG ASP
ARG ARG ARG GLU HIS PHE GLY GLU GLU PRO PRO GLU GLU ASN ARG VAL HIS LEU GLY HIS ALA ILE MET SER PHE TYR ALA ALA LEU ILE ASP LEU LEU GLY ARG CYS ALA PRO GLU MET HIS LEU ILE GLN ALA GLY LYS GLU GLU ALA LEU ARG ILE ARG LEU ILE SER LEU
VAL PRO LEU ASP ASP LEU VAL GLY ILE ILE SER LEU PRO LEN ILE PRO THR LEU GLY LYS ASP GLY ALA LEU VAL GLN PRO LYS MET SER ALA SER PHE LEU ASP ARG VAL TYR GLY ILE GLU GLN GLN PHE LEU LEU HIS
VAL LEU ASP VAL GLY PHE LEU PRO ASP MET ARG ALA ALA SER LEU ASP THR ALA THR PHE SER THR THR GLU MET ALA LEU ASN ARG TYR LEU CYS LEU LEU PRO LEU PHE ALA GLY THR GLU HIS ARG MET MET
SER MET LEU HIS THR VAL TYR ARG LEU SER ARG GLY ARG SER LEU THR LYS ALA GLN ARG ASP VAL ILE GLU ASP CYS LEU MET ALA LEU CYS ARG TYR ILE ARG PRO SER MET LEU GLN HIS LEU LEU ARG ARG LEU VAL PHE ASP VAL PRO ILE LEU LEU ASN GLU PHE ALA LYS MET PRO
LEU LYS LEU LEU THR ASN HIS TYR GLU ARG CYS TRP LYS TYR TYR CYS LEU PRO THR GLY TRP ALA ASN PHE GLY VAL THR SER GLU GLU GLU LEU HIS LEU THR ARG LYS LEU PHE TRP GLY ILE PHE ASP SER LEU LEU ALA HIS LYS LYS TYR ASP GLN GLU LEU TYR ARG MET ALA MET
PRO CYS LEU CYS ALA ILE ALA GLY ALA LEU PRO PRO ASP TYR VAL ASP ALA SER TYR SER SER LYS ALA GLU LYS LYS ALA THR VAL ASP ALA GLU GLY GLY ASN PHE ASP PRO ARG PRO VAL GLU THR LEU ASN VAL ILE ILE PRO GLU LYS LYS LEU ASP SER PHE ILE ASN LYS PHE ALA GLU
TYR THR HIS GLU LYS TRP ALA PHE ASP LYS ILE GLN ASN ASN TRP SER TYR GLY GLU ASN VAL ASP GLU GLU LEU LYS THR HIS PRO MET LEU ARG PRO TYR LYS THR PHE SER GLU LYS ASP LYS GLU ILE TYR ARG TRP PRO ILE LYS GLU SER LEU LYS ALA MET ILE ALA TRP GLU
TRP THR ILE GLU LYS ALA ARG GLU GLY GLU GLU GLU ARG THR GLU LYS LYS LYS THR ARG LYS ILE SER GLN THR ALA GLN THR TYR ASP PRO ARG GLU GLY TYR THR ASP ARG GLU LEU SER GLY VAL THR LEU SER ARG GLU LEU LYS LYS LEU ALA GLN PRO PRO ASP GLU LYS ALA GLN GLU LEU LEU SER LYS PHE LEU GLN MET ALA MET LEU ALA GLU
ASN TYR HIS ASN THR TRP GLY ARG LYS LYS LYS GLN GLU LEU GLU ALA LYS GLY GLY GLY THR HIS PRO LEU LEU VAL PRO TYR ASP THR LEU THR ALA LYS GLU GLU LYS ALA GLN GLU LEU LEU LYS PHE LEU GLU MET ASN VAL ALA ARG ARG GLY
LEU LYS ASP MET GLU LEU ASP THR SER SER ILE GLU LYS ARG PHE ALA PHE GLY PHE LEU GLN GLN LEU LEU ARG TRP MET ASP ILE SER GLN GLU GLU PHE ILE ALA HIS LEU GLU ALA ALA VAL SER SER GLY ARG VAL GLU LYS SER PRO HIS GLU GLN GLN ARG ALA LYS
ILE LEU LEU PRO LEU ILE ASN GLN TYR PHE THR ASN HIS CYS LEU TYR PHE LEU SER THR PRO ALA LYS VAL LEU LEU GLY SER GLY HIS ALA SER ASN LYS GLU GLU LYS GLU MET ILE THR SER LEU PHE CYS LYS LEU ALA ALA LEU VAL ARG HIS ARG VAL SER LEU PHE ALA GLY THR ASP
ALA PRO ALA VAL VAL ASN CYS LEU HIS ILE LEU ALA ARG SER LEU ASP ALA ARG THR VAL MET LYS SER GLY PRO GLU ILE VAL LYS ALA ALA GLY LEU GLN SER ARG PHE PHE GLU SER ALA SER GLU ASP ILE GLU GLU LYS MET VAL GLU ASN LEU ARG LEU LYS GLY TYR ARG ARG ALA
GLN VAL LYS GLY VAL GLY GLN ASN LEU THR TYR THR THR VAL ALA LEU LEU PRO VAL LEU PHE GLN HIS ILE ALA GLN HIS GLN GLN PHE GLY ASP VAL ILE VAL GLN VAL SER CYS TYR ARG THR LEU GLU ARG GLY LYS SER ILE ILE TYR SER THR THR ASN
THR TYR VAL GLU LYS LEU LEU ARG PRO ALA LEU CYS LEU ALA ALA MET PRO VAL ALA PHE LEU GLU PRO GLN LEU ASN GLU TYR ASN ALA SER VAL TYR THR THR LYS SER PRO ARG GLU ARG ALA ILE LEU GLY LEU PRO ASN SER VAL GLU ASP PRO ALA ARG ASP GLY
PRO ASP ILE PRO VAL LEU MET ALA ASP ILE GLY GLY LEU ALA GLU ALA ARG TYR THR GLU MET PRO HIS VAL ILE GLU ILE THR LEU PRO MET LEU CYS SER TYR LEU PRO ARG TRP TRP GLU ARG GLY PRO GLU ALA PRO PRO PRO ALA LEU PRO GLY ALA
PRO PRO PRO CYS THR ALA VAL THR SER ASP HIS LEU ASN SER LEU GLY ILE ASP GLU ILE THR TRP MET LYS ARG CYS ALA VAL PHE ALA ASN GLN PRO ILE VAL SER ARG ALA ARG PRO GLU LEU LEU ILE HIS SER HIS PHE ILE PRO
THR ILE GLY ARG LEU ARG LYS LYS VAL ALA ALA GLU GLU GLU GLN LEU ARG LEU GLU ALA ALA LYS GLY GLU LEU LEU VAL ARG ASP GLU PHE SER VAL LEU CYS ARG ASP LEU TYR ALA LEU TYR PRO LEU LEU ILE ARG TYR VAL ASP ASN ASN ARG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T4241
I4242
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M4245
Q4246
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S4252
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G4179
R4180
I4181
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I4183
A4186
I4190
Y4194
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N4201
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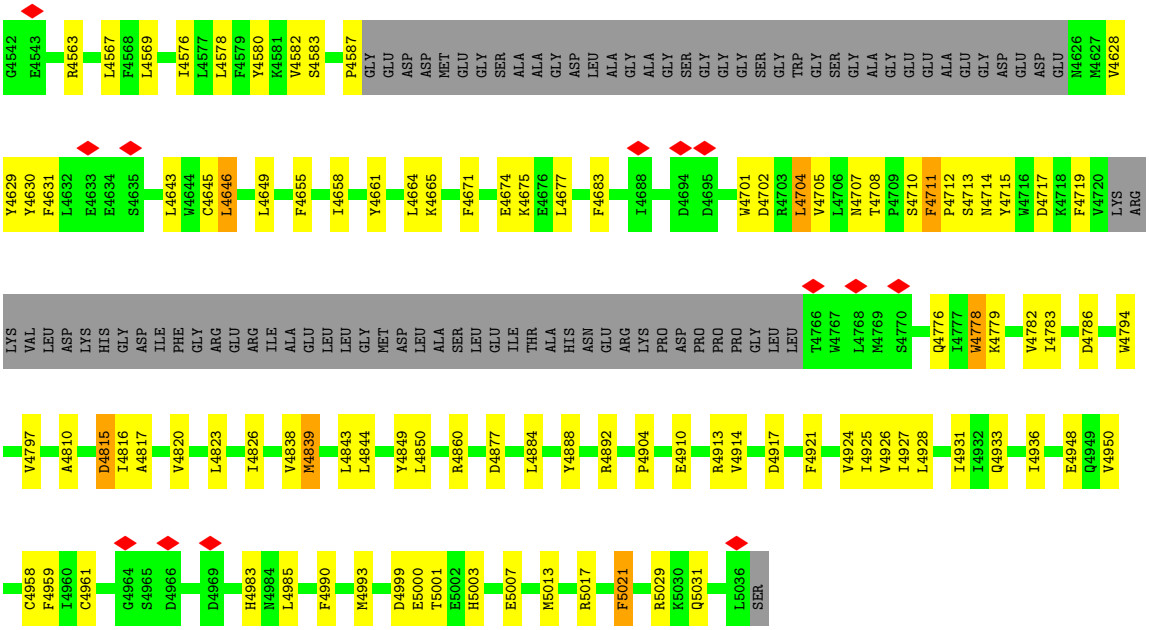
G4542 E4543 R4563 L4567 F4568 L4569 I4576 L4577 L4578 F4579 Y4580 K4581 V4582 S4583 P4587 GLY GLU ASP ASP MET GLU GLY SER ALA ALA GLY ASP LEU ALA GLY ALA GLY SER GLY GLY GLY SER GLY TRP GLY SER GLY ALA GLY GLU GLU ALA GLU GLY ASP GLU ASP GLU M4626 M4627 V4628
Y4629 Y4630 F4631 L4632 E4633 E4634 S4635 L4643 W4644 C4645 L4646 L4649 F4655 I4658 Y4661 L4664 K4665 F4671 E4674 K4675 E4676 L4677 F4683 I4688 D4694 D4695 W4701 D4702 R4703 L4704 V4705 L4706 N4707 T4708 P4709 S4710 F4711 P4712 S4713 N4714 Y4715 W4716 D4717 K4718 F4719 V4720 LYS ARG
LYS VAL LEU ASP LYS HIS GLY ASP ILE PHE GLY ARG GLU ARG ILE ALA GLU LEU LEU GLY MET ASP LEU ALA SER LEU GLU ILE THR ALA HIS ASN GLU ARG LYS PRO ASP PRO PRO PRO GLY LEU LEU T4766 W4767 L4768 M4769 S4770 Q4776 I4777 W4778 K4779 V4782 I4783 D4786 W4794
V4797 A4810 D4815 I4816 A4817 V4820 L4823 I4826 V4838 M4839 L4843 L4844 Y4849 L4850 R4860 D4877 L4884 Y4888 R4892 P4904 E4910 R4913 V4914 D4917 F4921 V4924 I4925 V4926 I4927 L4928 I4931 I4932 Q4933 I4936 E4948 Q4949 V4950
C4958 F4959 I4960 C4961 G4964 S4965 D4966 D4969 H4983 N4984 L4985 F4990 M4993 D4999 E5000 T5001 E5002 H5003 E5007 M5013 R5017 F5021 R5029 K5030 Q5031 L5036 SER

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, C4	Depositor
Number of particles used	335577	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 ($e^-/Å^2$)	50	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	3000	Depositor
Magnification	Not provided	
Image detector	FEI FALCON III (4k x 4k)	Depositor
Maximum map value	6.086	Depositor
Minimum map value	-4.106	Depositor
Average map value	0.002	Depositor
Map value standard deviation	0.091	Depositor
Recommended contour level	0.45	Depositor
Map size (Å)	479.36002, 479.36002, 479.36002	wwPDB
Map dimensions	448, 448, 448	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.07, 1.07, 1.07	Depositor

5 Model quality (i)

5.1 Standard geometry (i)

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

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\|>5$	RMSZ	$\#\|Z\|>5$
1	A	0.29	0/4016	0.48	0/5470
1	B	0.29	0/4016	0.48	0/5470
1	C	0.29	0/4016	0.47	0/5470
1	D	0.29	0/4016	0.48	0/5470
All	All	0.29	0/16064	0.48	0/21880

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3908	0	3613	113	0
1	B	3908	0	3613	113	0
1	C	3908	0	3613	119	0
1	D	3908	0	3613	114	0
2	A	14	0	10	1	0
2	B	14	0	10	1	0
2	C	14	0	10	1	0
2	D	14	0	10	1	0
3	A	31	0	12	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	31	0	12	1	0
3	C	31	0	12	1	0
3	D	31	0	12	1	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
All	All	15816	0	14540	353	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 12.

The worst 5 of 353 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:4838:VAL:HG11	1:B:4338:VAL:HG11	1.45	0.99
1:C:4838:VAL:HG11	1:D:4338:VAL:HG11	1.45	0.96
1:B:4838:VAL:HG11	1:C:4338:VAL:HG11	1.50	0.92
1:C:4927:ILE:HD11	1:D:4936:ILE:HD13	1.57	0.87
1:A:4338:VAL:HG11	1:D:4838:VAL:HG11	1.54	0.87

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	502/5037 (10%)	492 (98%)	10 (2%)	0	100	100
1	B	502/5037 (10%)	491 (98%)	11 (2%)	0	100	100
1	C	502/5037 (10%)	490 (98%)	12 (2%)	0	100	100
1	D	502/5037 (10%)	491 (98%)	11 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	2008/20148 (10%)	1964 (98%)	44 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	365/4276 (8%)	346 (95%)	19 (5%)	19	39
1	B	365/4276 (8%)	345 (94%)	20 (6%)	18	36
1	C	365/4276 (8%)	345 (94%)	20 (6%)	18	36
1	D	365/4276 (8%)	345 (94%)	20 (6%)	18	36
All	All	1460/17104 (8%)	1381 (95%)	79 (5%)	21	37

5 of 79 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	5001	THR
1	D	4719	PHE
1	D	4180	ARG
1	D	4580	TYR
1	D	4948	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	4707	ASN
1	B	4707	ASN
1	C	4707	ASN
1	D	4707	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)

Of 12 ligands modelled in this entry, 4 are monoatomic - leaving 8 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	$\#\|Z\| > 2$
2	CFF	C	5101	-	8,15,15	1.18	1 (12%)	8,23,23	2.67	3 (37%)
2	CFF	D	5101	-	8,15,15	1.18	1 (12%)	8,23,23	2.67	3 (37%)
3	ATP	D	5102	-	28,33,33	0.63	0	34,52,52	0.59	1 (2%)
3	ATP	A	5102	-	28,33,33	0.63	0	34,52,52	0.59	1 (2%)
2	CFF	B	5101	-	8,15,15	1.18	1 (12%)	8,23,23	2.67	3 (37%)
2	CFF	A	5101	-	8,15,15	1.18	1 (12%)	8,23,23	2.67	3 (37%)
3	ATP	C	5102	-	28,33,33	0.63	0	34,52,52	0.59	1 (2%)
3	ATP	B	5102	-	28,33,33	0.63	0	34,52,52	0.59	1 (2%)

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
2	CFF	C	5101	-	-	-	0/2/2/2
2	CFF	D	5101	-	-	-	0/2/2/2
3	ATP	D	5102	-	-	9/18/38/38	0/3/3/3
3	ATP	A	5102	-	-	9/18/38/38	0/3/3/3
2	CFF	B	5101	-	-	-	0/2/2/2
2	CFF	A	5101	-	-	-	0/2/2/2
3	ATP	C	5102	-	-	9/18/38/38	0/3/3/3
3	ATP	B	5102	-	-	9/18/38/38	0/3/3/3

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	5101	CFF	C6-N1	2.88	1.42	1.38
2	B	5101	CFF	C6-N1	2.88	1.42	1.38
2	C	5101	CFF	C6-N1	2.88	1.42	1.38
2	D	5101	CFF	C6-N1	2.88	1.42	1.38

The worst 5 of 16 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	5101	CFF	C5-C6-N1	-5.55	112.56	118.20
2	B	5101	CFF	C5-C6-N1	-5.55	112.56	118.20
2	C	5101	CFF	C5-C6-N1	-5.55	112.56	118.20
2	D	5101	CFF	C5-C6-N1	-5.55	112.56	118.20
2	A	5101	CFF	C4-C5-C6	3.89	122.92	119.96

There are no chirality outliers.

5 of 36 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	A	5102	ATP	O4'-C4'-C5'-O5'
3	B	5102	ATP	O4'-C4'-C5'-O5'
3	C	5102	ATP	O4'-C4'-C5'-O5'
3	D	5102	ATP	O4'-C4'-C5'-O5'
3	A	5102	ATP	C3'-C4'-C5'-O5'

There are no ring outliers.

8 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	5101	CFF	1	0

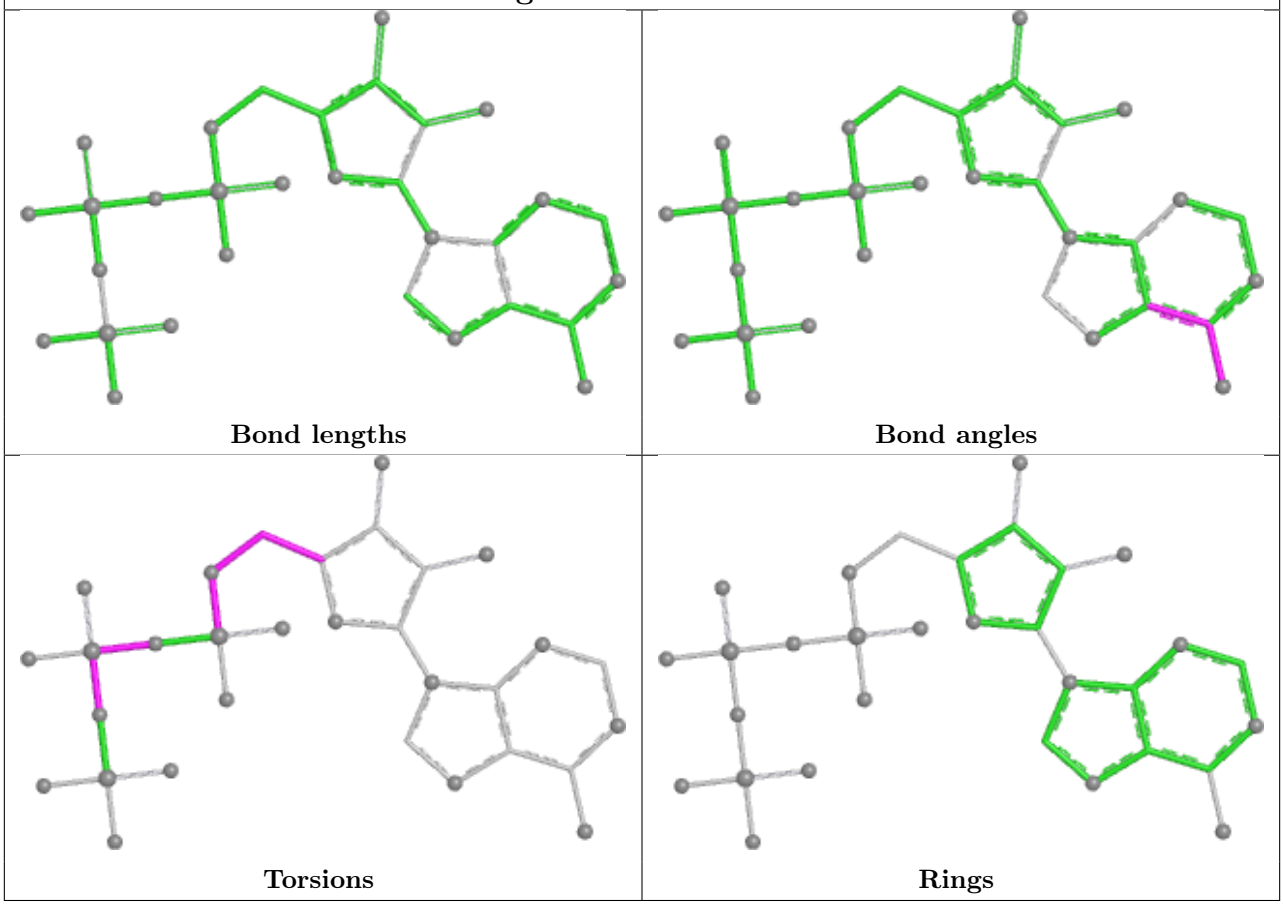
Continued on next page...

Continued from previous page...

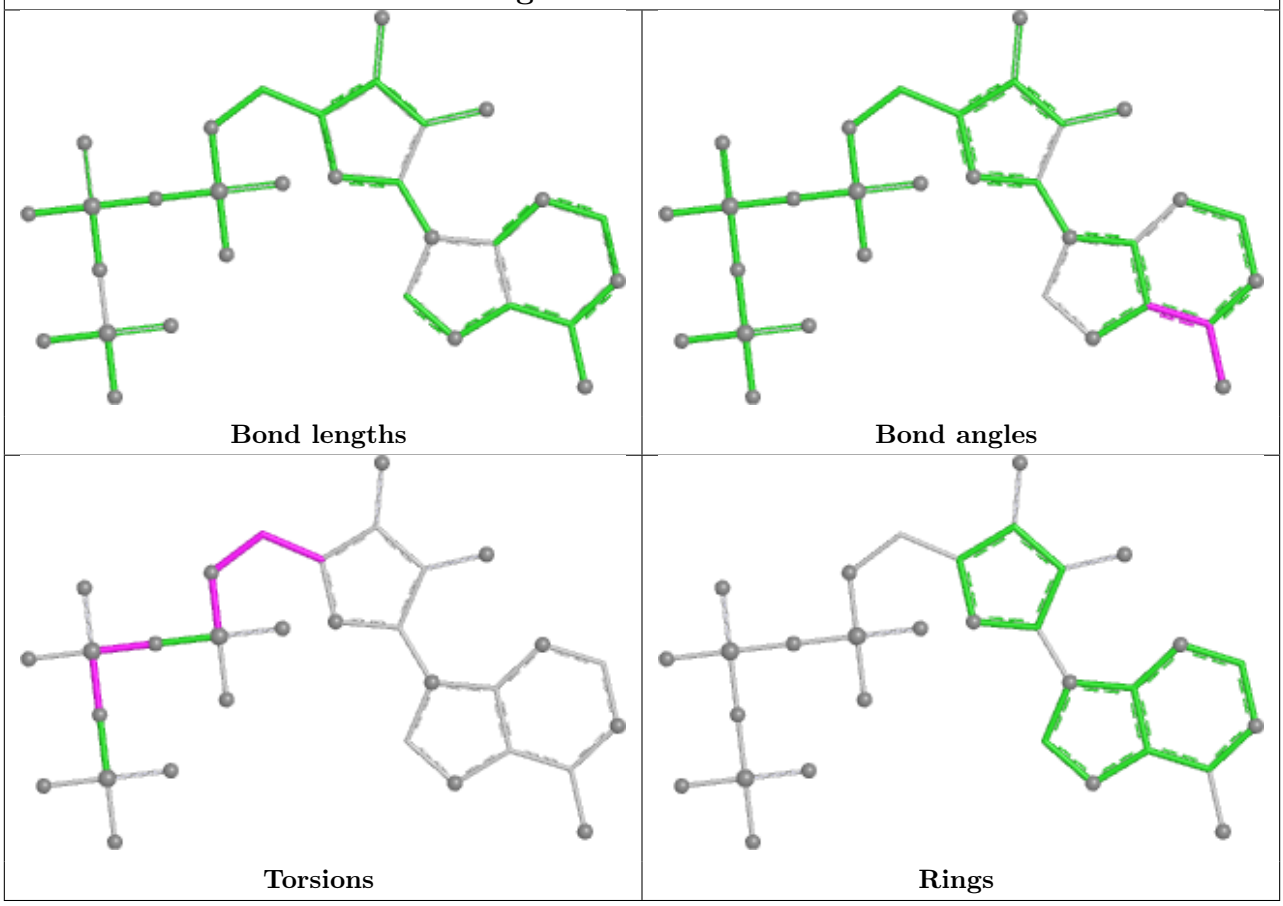
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	5101	CFF	1	0
3	D	5102	ATP	1	0
3	A	5102	ATP	1	0
2	B	5101	CFF	1	0
2	A	5101	CFF	1	0
3	C	5102	ATP	1	0
3	B	5102	ATP	1	0

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.

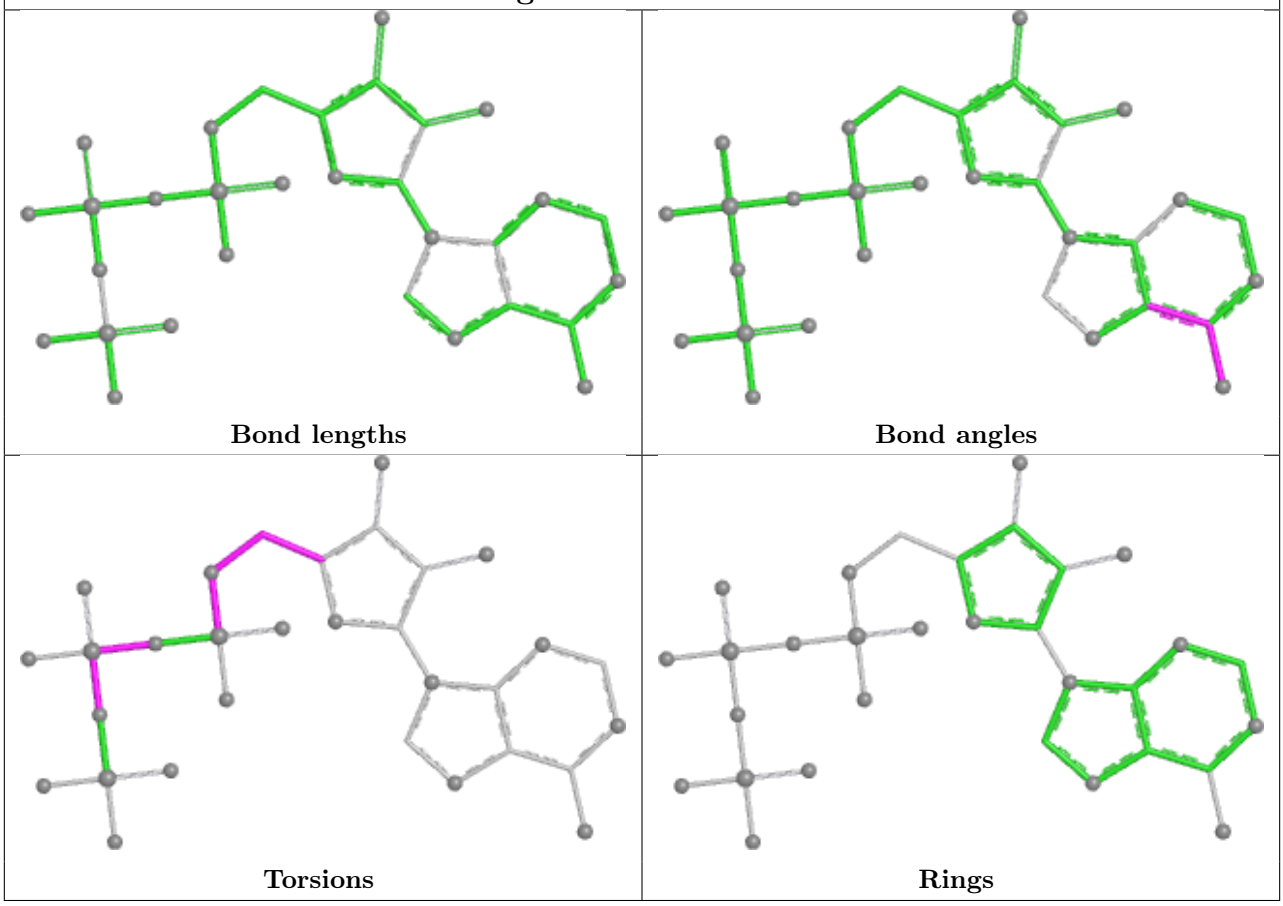
Ligand ATP D 5102

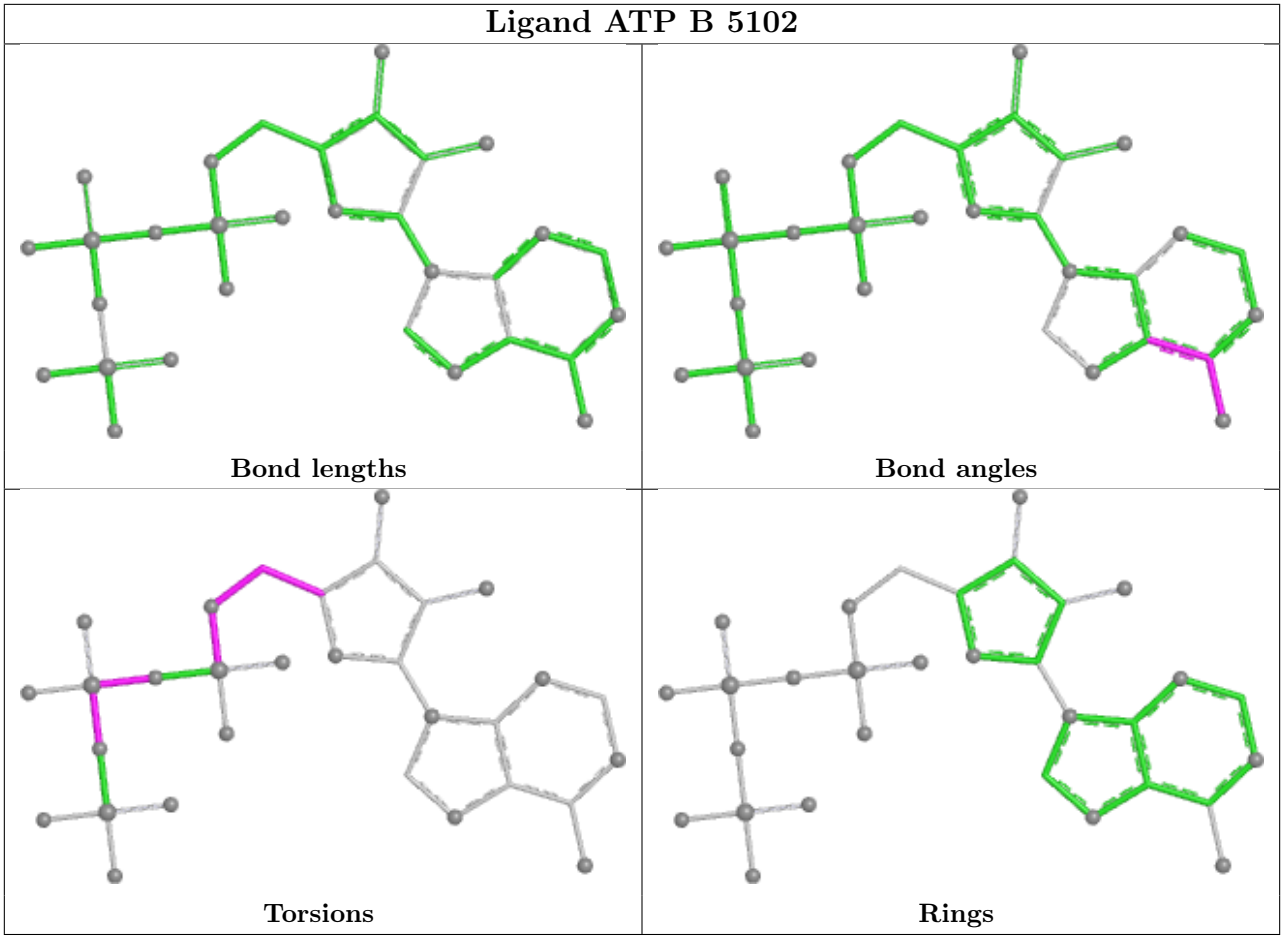


Ligand ATP A 5102



Ligand ATP C 5102





5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Map visualisation (i)

This section contains visualisations of the EMDB entry EMD-27680. These allow visual inspection of the internal detail of the map and identification of artifacts.

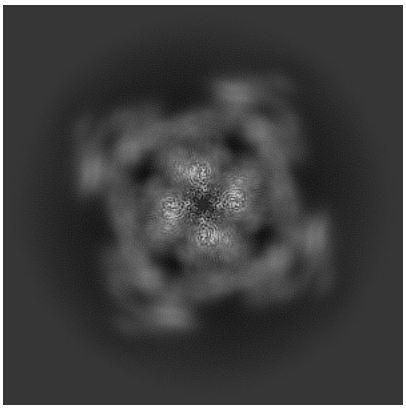
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections (i)

6.1.1 Primary map

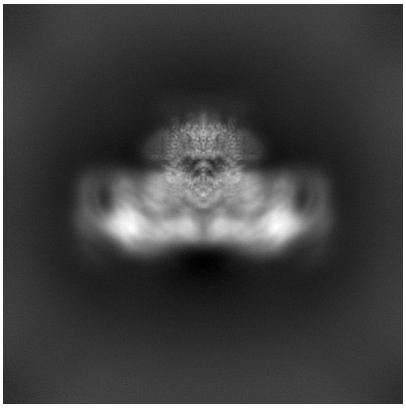
X

Y

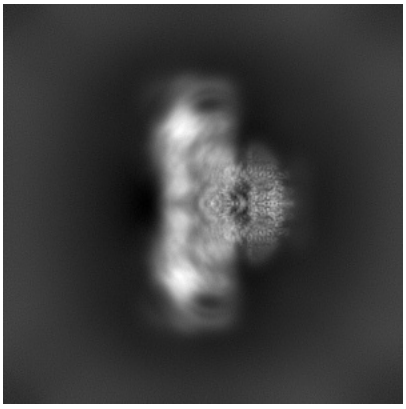


Z

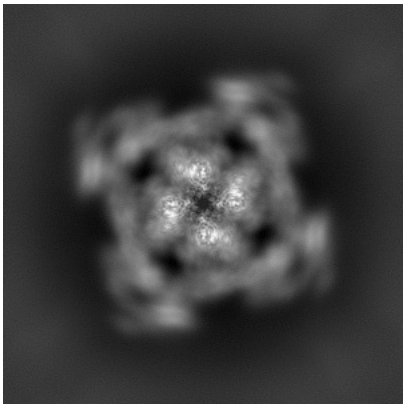
6.1.2 Raw map



X



Y

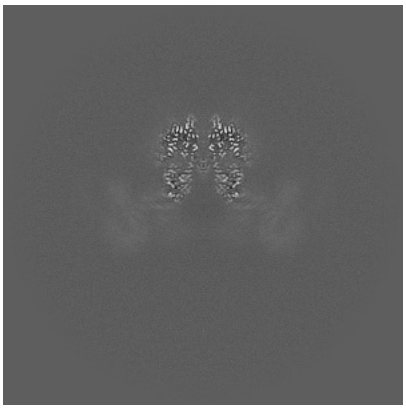


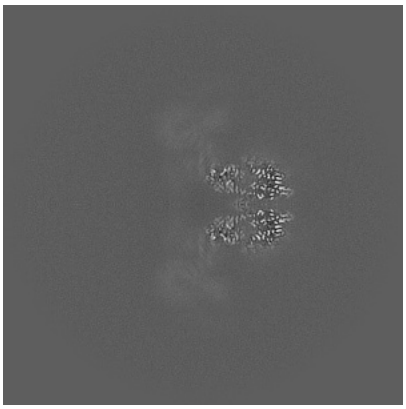
Z

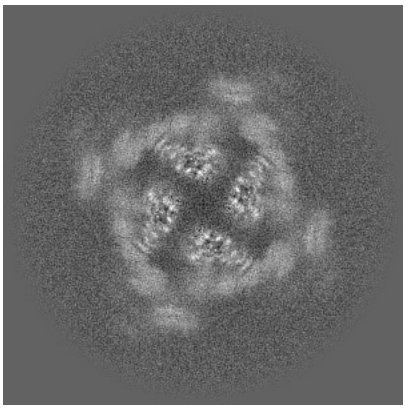
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

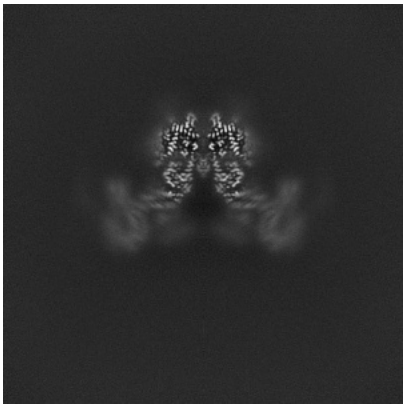
6.2.1 Primary map

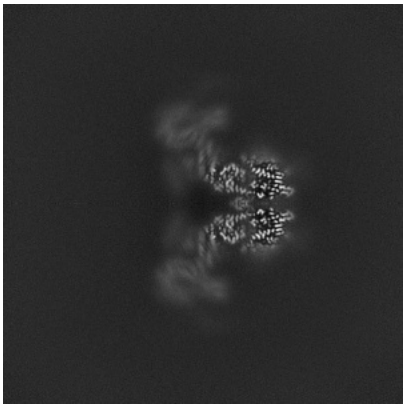

X Index: 224

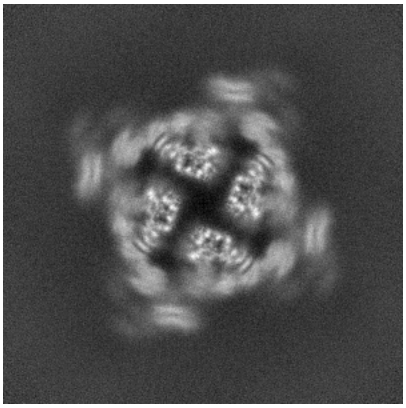

Y Index: 224


Z Index: 224

6.2.2 Raw map


X Index: 224

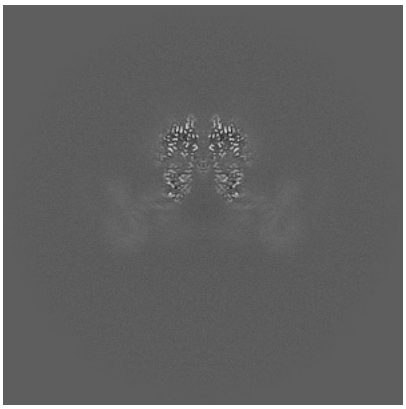

Y Index: 224


Z Index: 224

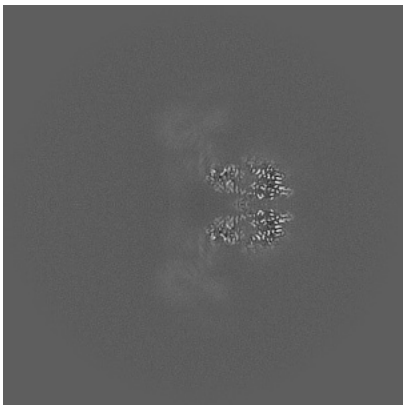
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

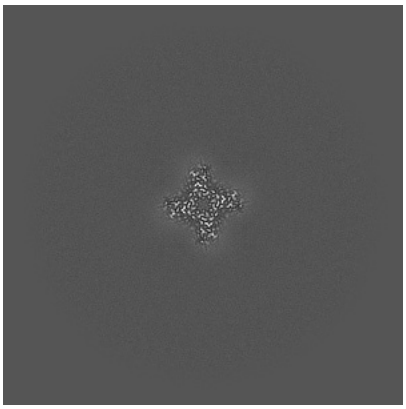
6.3.1 Primary map



X Index: 224

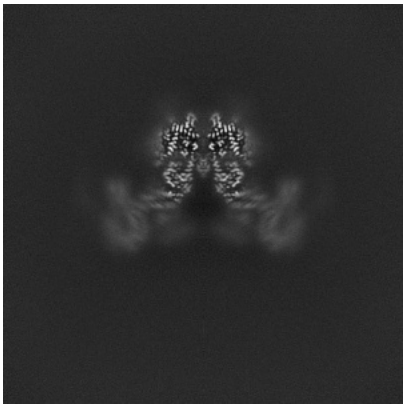


Y Index: 224

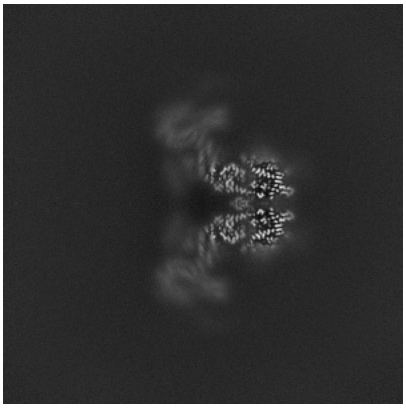


Z Index: 302

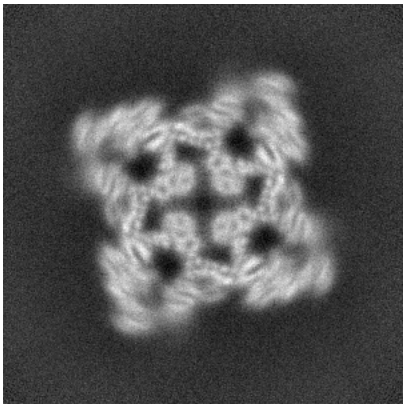
6.3.2 Raw map



X Index: 224



Y Index: 224

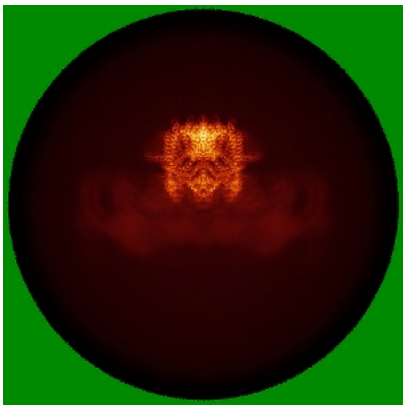


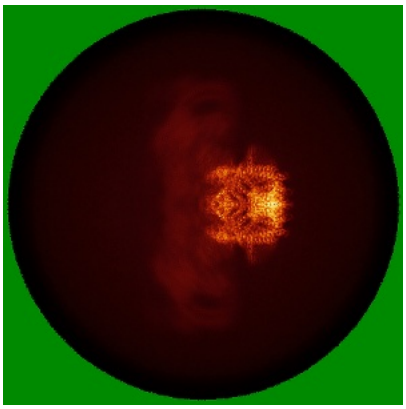
Z Index: 201

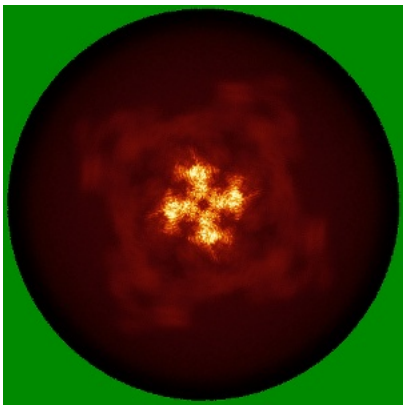
The images above show the largest variance slices of the map in three orthogonal directions.

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

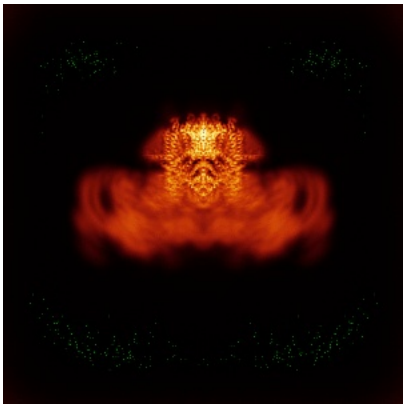
6.4.1 Primary map

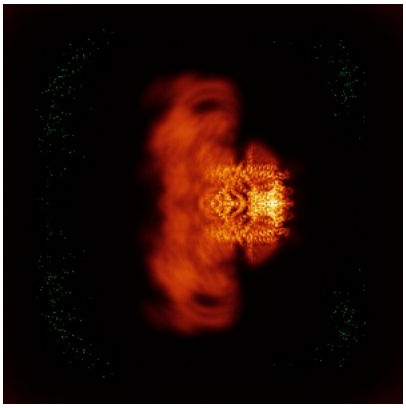

X

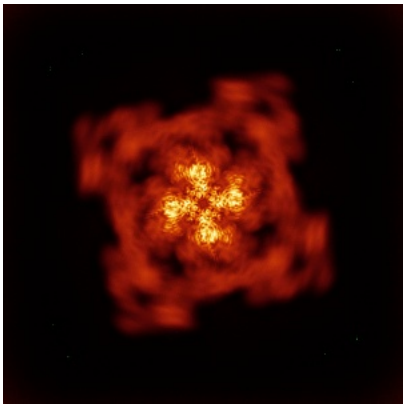

Y


Z

6.4.2 Raw map


X

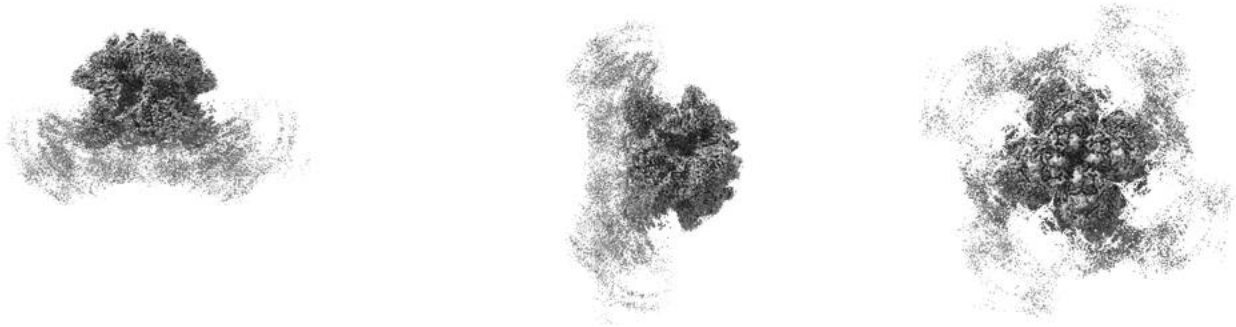

Y


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)

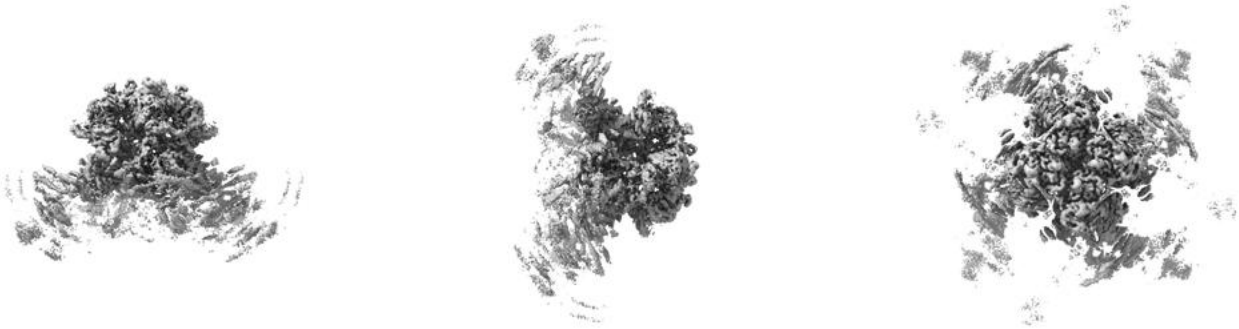
6.5.1 Primary map



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.45. 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.

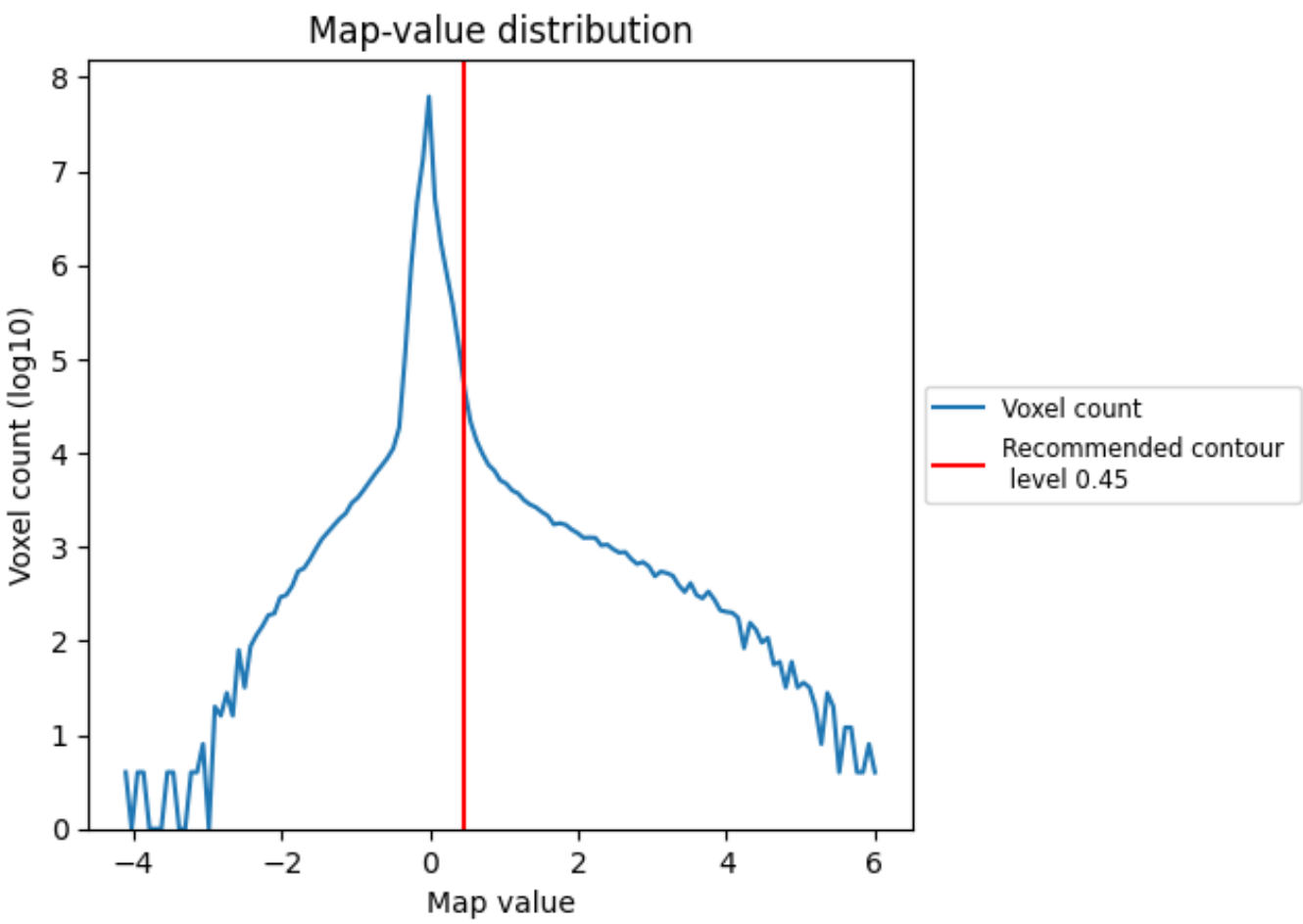
6.6 Mask visualisation (i)

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

7 Map analysis (i)

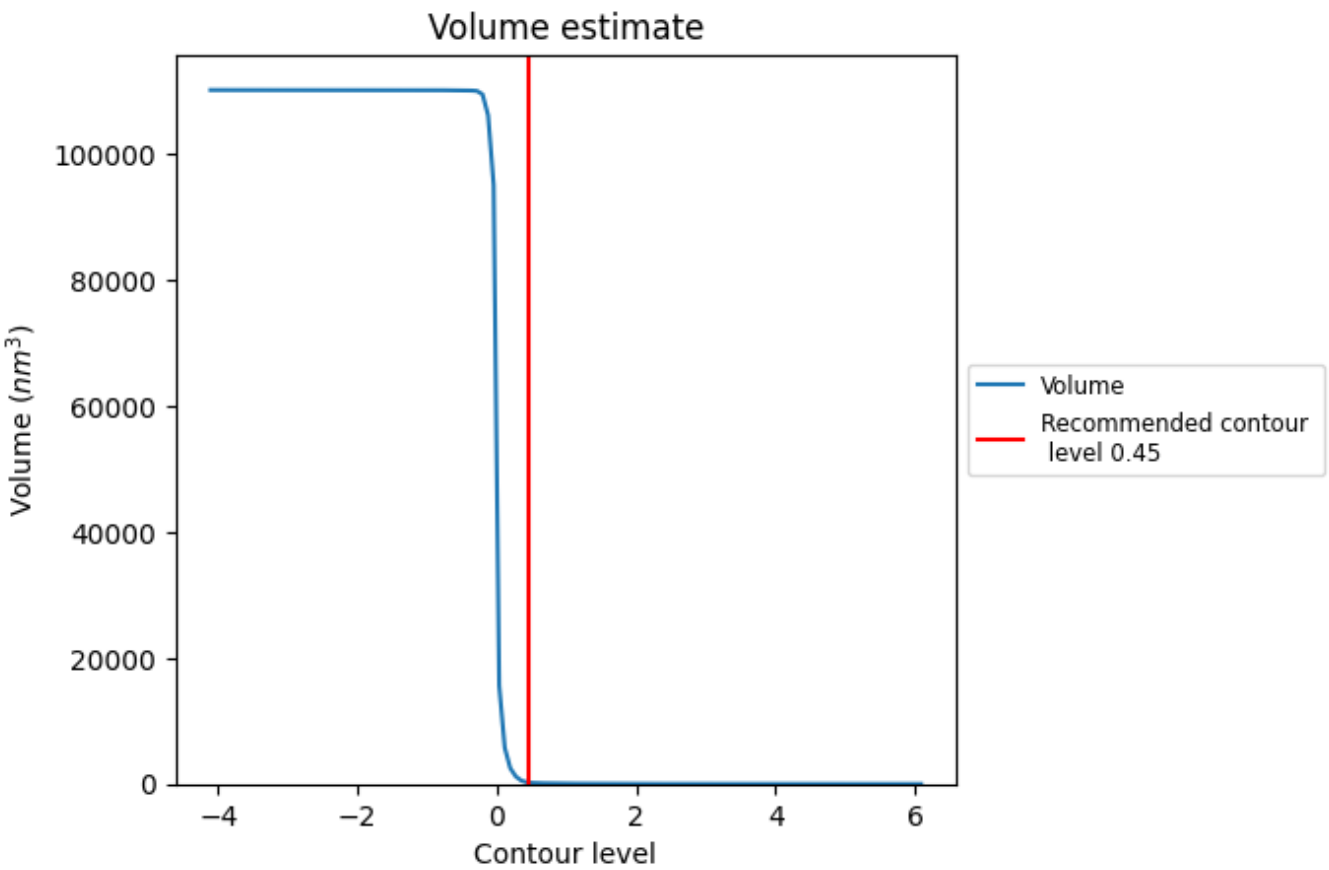
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution (i)



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

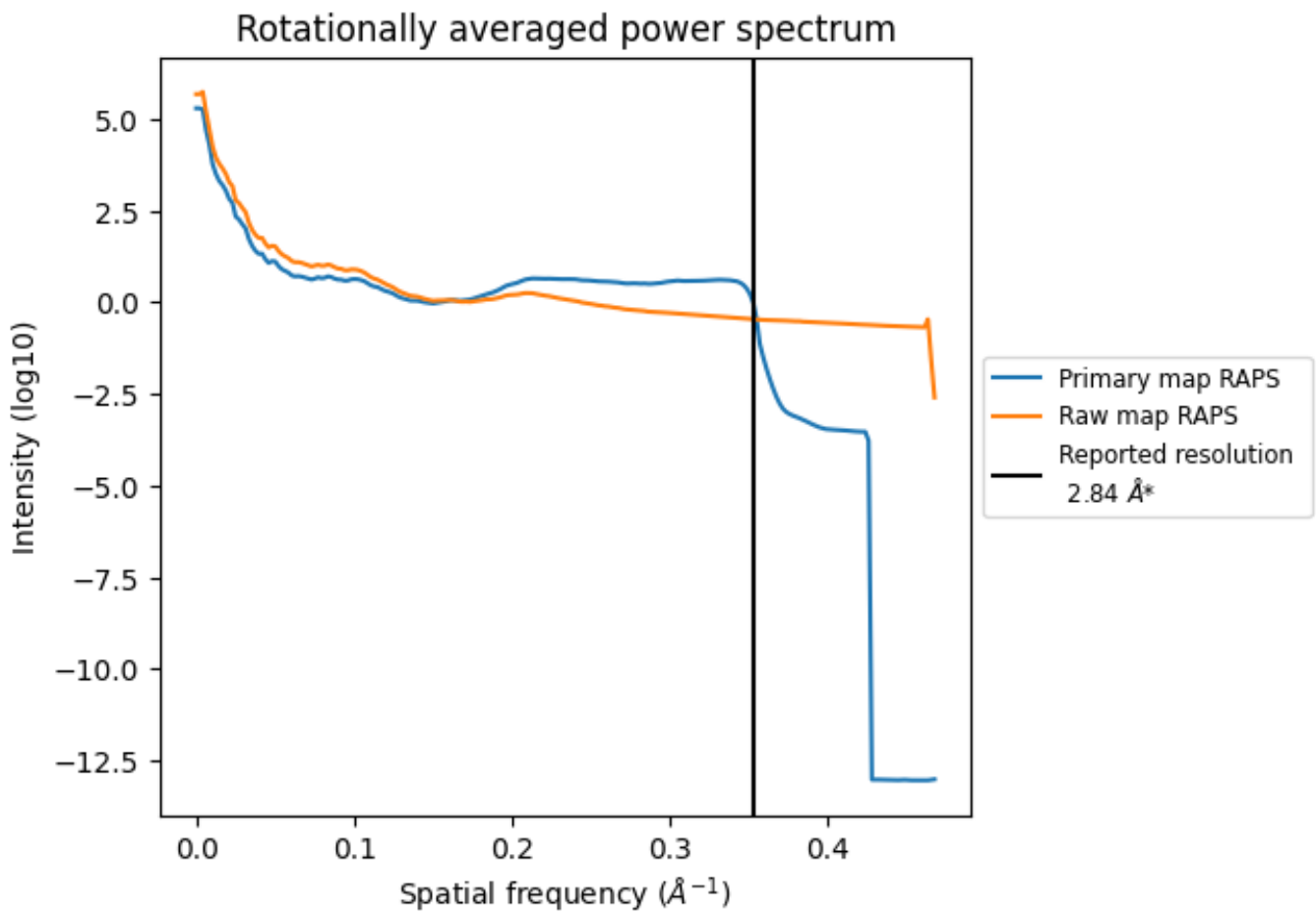
7.2 Volume estimate (i)



The volume at the recommended contour level is 234 nm^3; this corresponds to an approximate mass of 211 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)

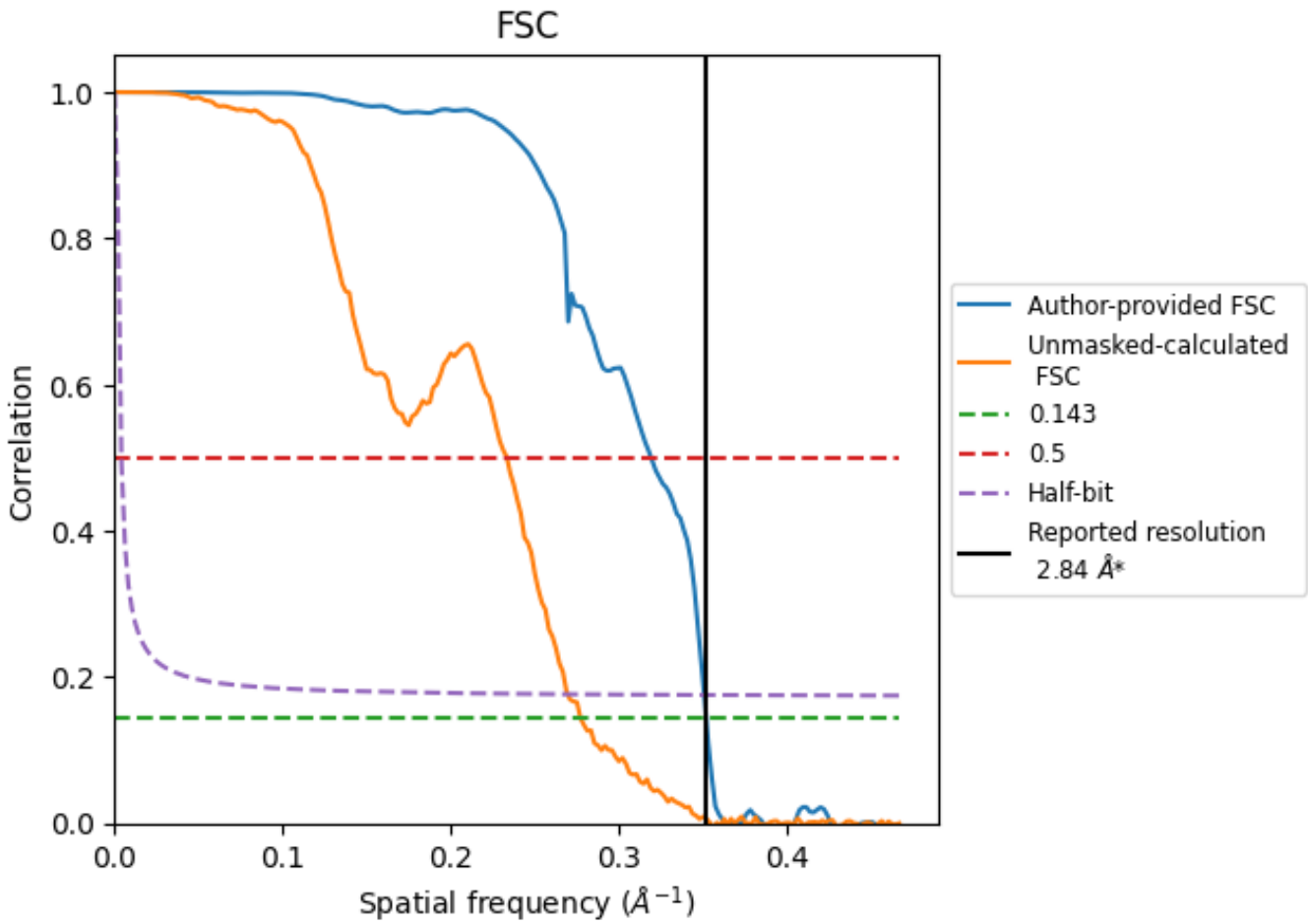


*Reported resolution corresponds to spatial frequency of 0.352 Å^{-1}

8 Fourier-Shell correlation (i)

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 (i)



*Reported resolution corresponds to spatial frequency of 0.352 Å^{-1}

8.2 Resolution estimates (i)

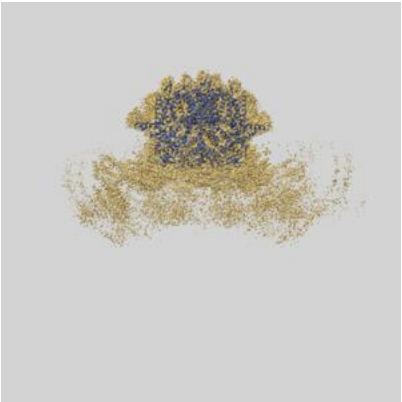
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	2.84	-	-
Author-provided FSC curve	2.84	3.13	2.85
Unmasked-calculated*	3.60	4.28	3.71

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 3.60 differs from the reported value 2.84 by more than 10 %

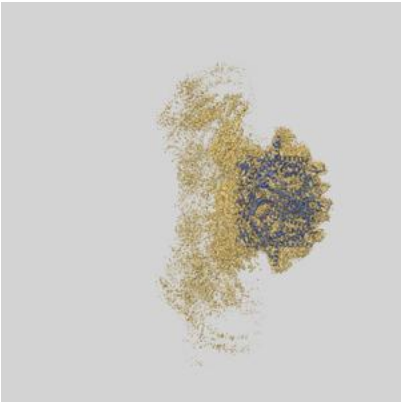
9 Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-27680 and PDB model 8DRP. Per-residue inclusion information can be found in section 3 on page 5.

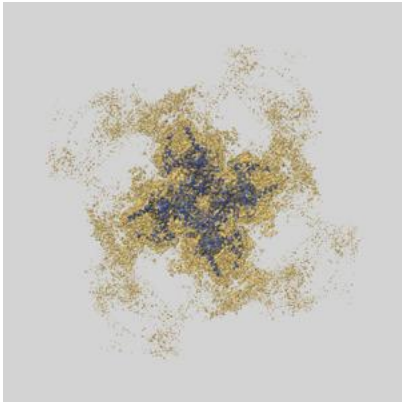
9.1 Map-model overlay (i)



X



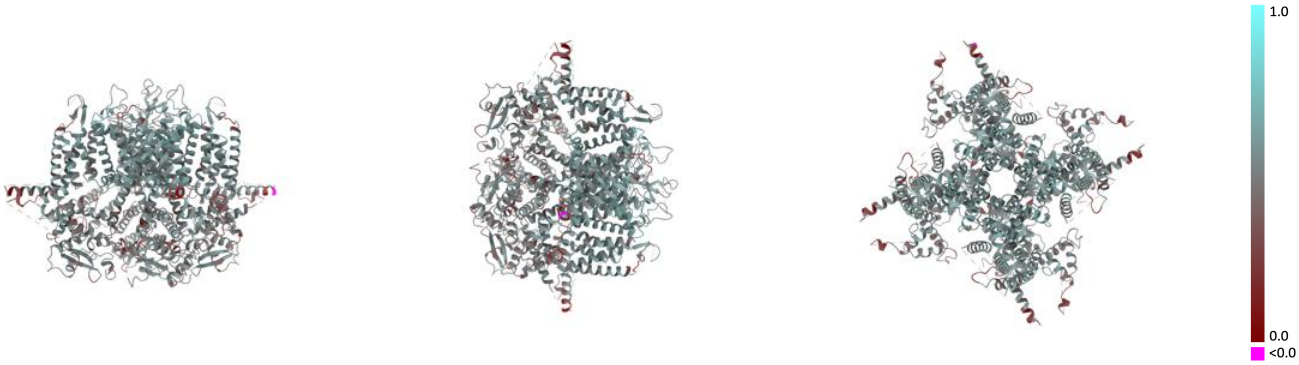
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.45 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.

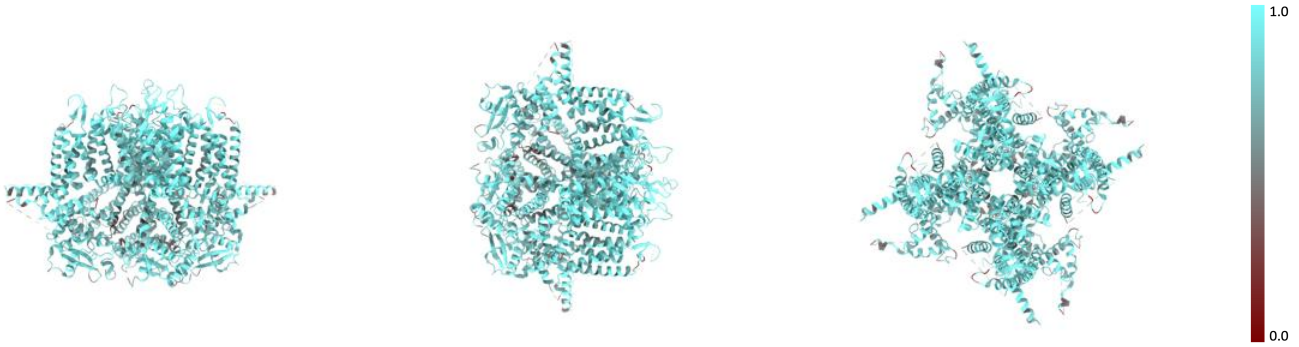
9.2 Q-score mapped to coordinate model (i)



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.

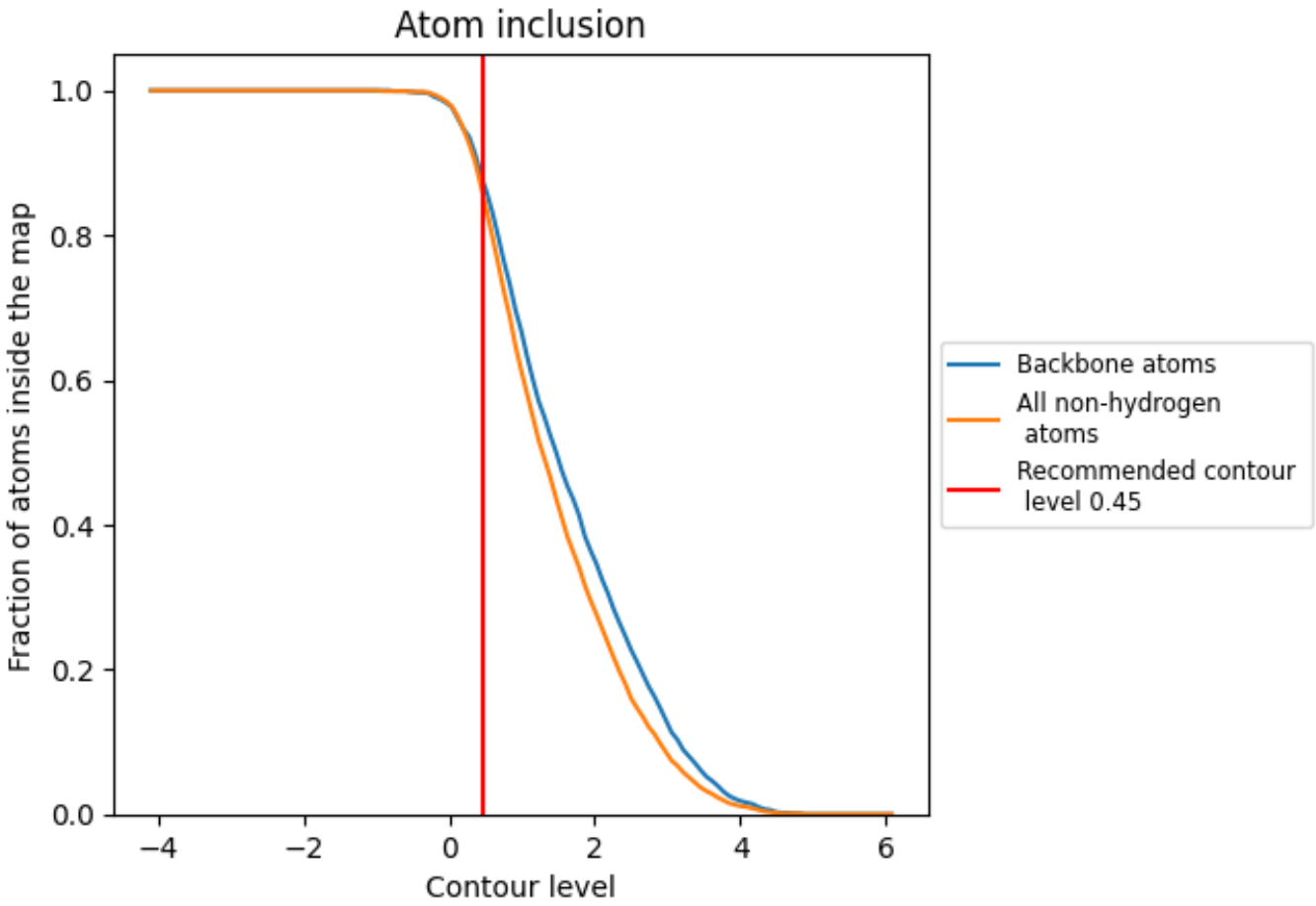
9.3 Atom inclusion mapped to coordinate model (i)



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 (0.45).

9.4 Atom inclusion (i)



At the recommended contour level, 88% of all backbone atoms, 86% 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 (0.45) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.8620	0.5140
A	0.8610	0.5140
B	0.8620	0.5140
C	0.8620	0.5140
D	0.8620	0.5140