



## Full wwPDB EM Validation Report ⓘ

Dec 19, 2022 – 12:55 pm GMT

PDB ID : 7NPR  
EMDB ID : EMD-12517  
Title : Structure of an intact ESX-5 inner membrane complex, Composite C3 model  
Authors : Fahrenkamp, D.; Bunduc, C.M.; Wald, J.; Ummels, R.; Bitter, W.; Houben, E.N.G.; Marlovits, T.C.  
Deposited on : 2021-02-28  
Resolution : 3.82 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto: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>.

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

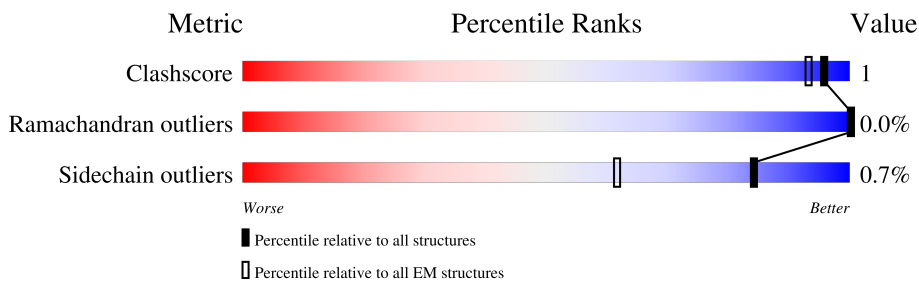
EMDB validation analysis : 0.0.1.dev43  
MolProbity : 4.02b-467  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
MapQ : 1.9.9  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.31.3

# 1 Overall quality at a glance i

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

The reported resolution of this entry is 3.82 Å.

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



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

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 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  $\leq 5\%$ . 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	B1	506	
1	B2	506	
1	B3	506	
1	B4	506	
1	B5	506	
1	B6	506	
2	C1	1391	
2	C2	1391	

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Mol	Chain	Length	Quality of chain
2	C3	1391	7% 28% 71%
2	C4	1391	12% 28% 71%
2	C5	1391	7% 28% 71%
2	C6	1391	12% 28% 71%
3	D1	503	28% 93% 19%
3	D2	503	30% 79% 19%
3	D3	503	18% 94% 19%
3	D4	503	16% 81% 17%
3	D5	503	28% 93% 19%
3	D6	503	31% 79% 19%
3	D7	503	19% 93% 19%
3	D8	503	16% 79% 19%
3	D9	503	27% 92% 19%
3	DA	503	30% 79% 19%
3	DB	503	18% 93% 19%
3	DC	503	15% 79% 19%
4	P1	585	74% 24%
4	P2	585	74% 24%
4	P3	585	74% 24%

## 2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 182470 atoms, of which 92300 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 ESX-5 secretion system ATPase EccB5.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
1	B1	478	Total	C	H	N	O	S	0	0
			7218	2266	3631	639	671	11		
1	B2	478	Total	C	H	N	O	S	0	0
			7218	2266	3631	639	671	11		
1	B3	478	Total	C	H	N	O	S	0	0
			7218	2266	3631	639	671	11		
1	B4	480	Total	C	H	N	O	S	0	0
			7212	2262	3621	644	675	10		
1	B5	480	Total	C	H	N	O	S	0	0
			7212	2262	3621	644	675	10		
1	B6	480	Total	C	H	N	O	S	0	0
			7212	2262	3621	644	675	10		

- Molecule 2 is a protein called ESX-5 secretion system protein EccC5.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
2	C1	406	Total	C	H	N	O	S	0	0
			6335	2052	3145	536	576	26		
2	C2	406	Total	C	H	N	O	S	0	0
			6335	2052	3145	536	576	26		
2	C3	406	Total	C	H	N	O	S	0	0
			6335	2052	3145	536	576	26		
2	C4	406	Total	C	H	N	O	S	0	0
			6335	2052	3145	536	576	26		
2	C5	406	Total	C	H	N	O	S	0	0
			6335	2052	3145	536	576	26		
2	C6	406	Total	C	H	N	O	S	0	0
			6335	2052	3145	536	576	26		

- Molecule 3 is a protein called ESX-5 secretion system protein EccD5.

Mol	Chain	Residues	Atoms						AltConf	Trace
			Total	C	H	N	O	S		
3	D1	485	Total	C	H	N	O	S	0	0
			7458	2353	3823	633	628	21		

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Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
3	D2	405	Total	C	H	N	O	S	0	0
			6155	1919	3166	528	524	18		
3	D3	485	Total	C	H	N	O	S	0	0
			7459	2353	3824	633	628	21		
3	D4	415	Total	C	H	N	O	S	0	0
			6308	1969	3245	541	535	18		
3	D5	485	Total	C	H	N	O	S	0	0
			7459	2353	3824	633	628	21		
3	D6	405	Total	C	H	N	O	S	0	0
			6155	1919	3166	528	524	18		
3	D7	485	Total	C	H	N	O	S	0	0
			7459	2353	3824	633	628	21		
3	D8	405	Total	C	H	N	O	S	0	0
			6154	1919	3165	528	524	18		
3	D9	485	Total	C	H	N	O	S	0	0
			7459	2353	3824	633	628	21		
3	DA	405	Total	C	H	N	O	S	0	0
			6156	1919	3167	528	524	18		
3	DB	485	Total	C	H	N	O	S	0	0
			7459	2353	3824	633	628	21		
3	DC	405	Total	C	H	N	O	S	0	0
			6154	1919	3165	528	524	18		

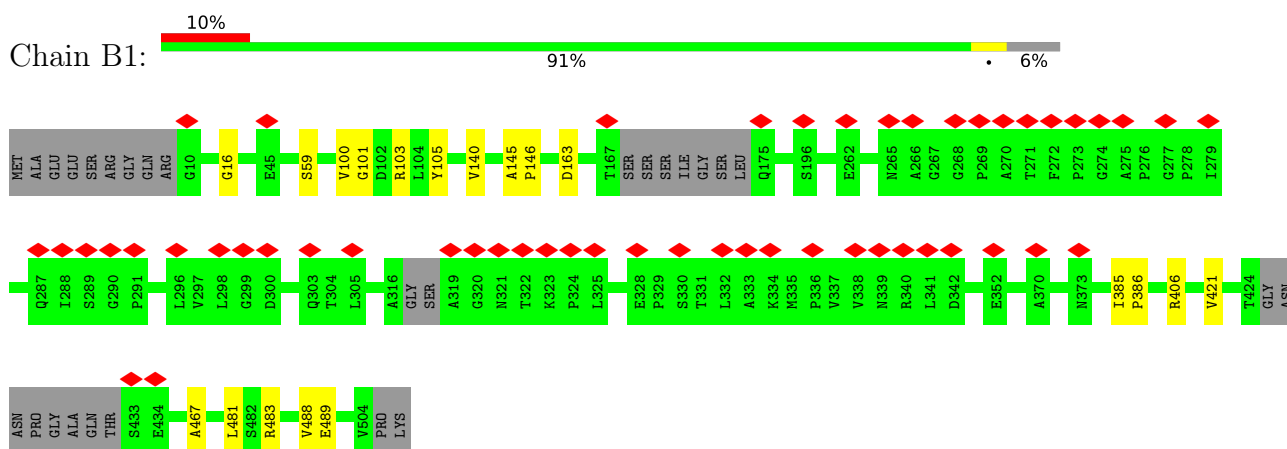
- Molecule 4 is a protein called Mycosin-5.

Mol	Chain	Residues	Atoms					AltConf	Trace	
			Total	C	H	N	O			S
4	P1	444	Total	C	H	N	O	S	0	0
			6445	2046	3219	554	611	15		
4	P2	444	Total	C	H	N	O	S	0	0
			6445	2046	3219	554	611	15		
4	P3	444	Total	C	H	N	O	S	0	0
			6445	2046	3219	554	611	15		

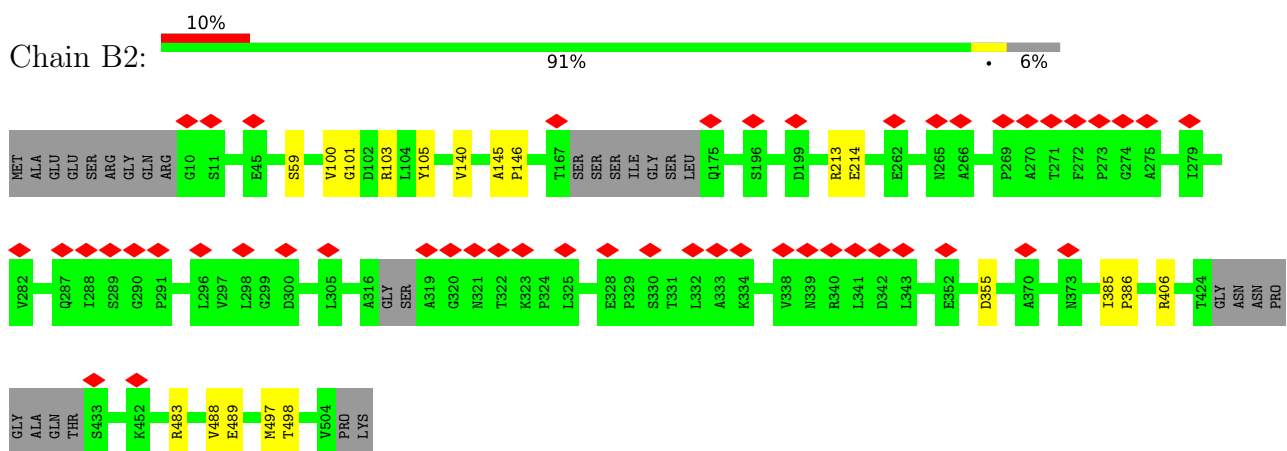
### 3 Residue-property plots

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

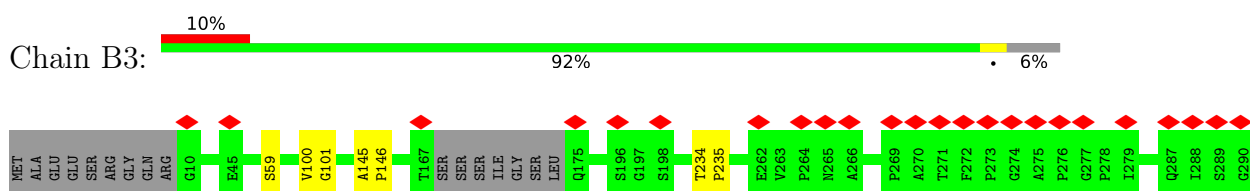
- Molecule 1: ESX-5 secretion system ATPase EccB5

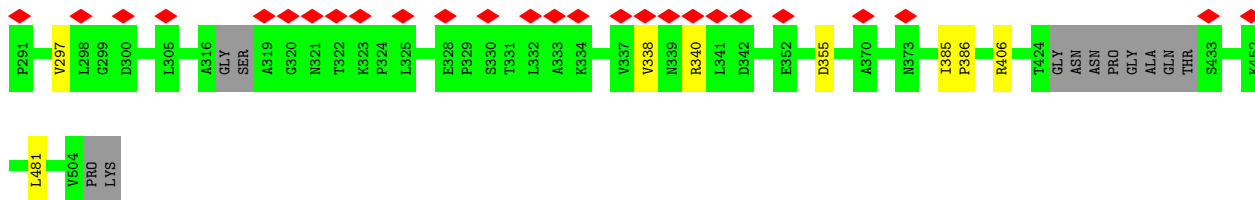


- Molecule 1: ESX-5 secretion system ATPase EccB5

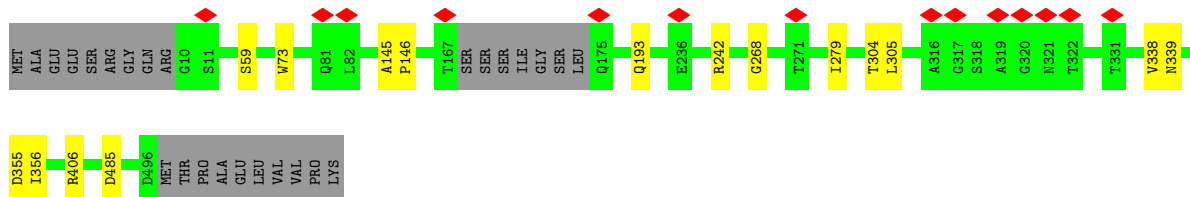


- Molecule 1: ESX-5 secretion system ATPase EccB5

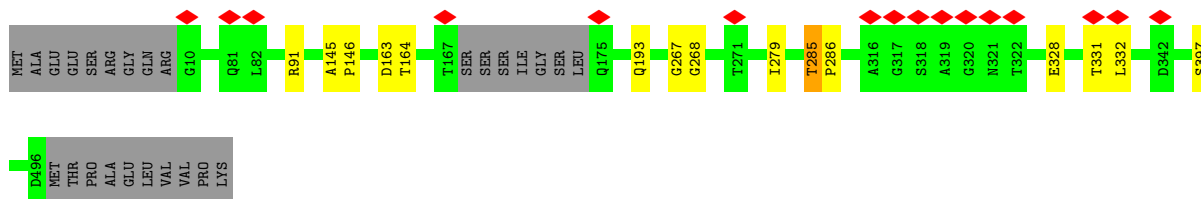




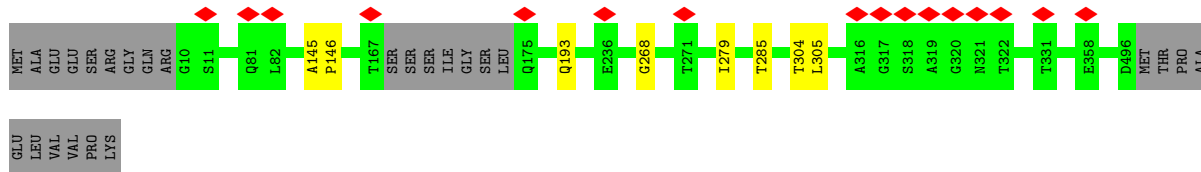
• Molecule 1: ESX-5 secretion system ATPase EccB5



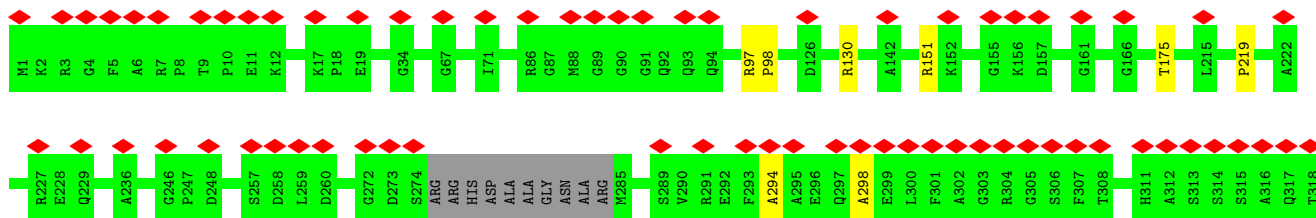
• Molecule 1: ESX-5 secretion system ATPase EccB5



• Molecule 1: ESX-5 secretion system ATPase EccB5



• Molecule 2: ESX-5 secretion system protein EccC5



P319	T320	P321	D328	V329	D330	D331	P332	Q333	W334	E335	Y336	V337	I338	S339	A340	E341	D344	F348	S354	S355	M356	W357	D359	I360	R363	D368	D388	K389	A390	D397	E403	A404	E405	L411	A412	R415	L416	ALA	GLU	ALA	TYR	GLU	ILE	ILE	GLY	GLN	ARG		
VAL	ALA	HIS	ALA	GLY	ILE	LEU	VAL	ASP	TYR	GLY	ILE	ASP	PRO	GLY	ASN	ILE	ASP	LEU	TRP	ALA	GLY	THR	ASP	THR	ARG	ARG	LEU	ARG	ALA	PRO	PHE	GLY	ASN	GLY	GLU	LEU	LEU	PHE	LEU	LEU	LEU	PRO	VAL	GLY	PRO	LEU	GLY	GLN	ARG
ASP	GLU	GLY	ILE	ASP	PRO	HIS	VAL	ASP	GLY	THR	THR	GLY	ASP	GLY	LEU	THR	ASP	VAL	ILE	LEU	GLY	THR	LEU	HIS	GLY	GLU	LEU	GLN	ASP	VAL	LEU	LEU	ALA	GLY	SER	ALA	VAL	VAL	LEU	LEU	LEU	PRO	PRO	LEU	VAL	PRO	HIS		
VAL	SER	ARG	ILE	ASP	LEU	GLY	GLU	VAL	GLN	ALA	LEU	MET	THR	ASP	ALA	THR	ASP	VAL	ILE	LEU	GLY	THR	VAL	ILE	VAL	ASP	ASP	GLN	ASP	VAL	LEU	LEU	ALA	ARG	MET	ALA	ARG	VAL	VAL	LEU	LEU	LEU	PRO	PRO	LEU	VAL	PRO	PRO	
LEU	PRO	MET	VAL	VAL	ILE	VAL	ASP	PHE	TYR	GLY	TRP	PHE	THR	PRO	ALA	ALA	VAL	ASP	SER	LEU	GLY	THR	VAL	ILE	LEU	LEU	LEU	MET	ALA	ALA	LEU	LEU	ARG	MET	ALA	ARG	VAL	GLY	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	LEU	ARG
LEU	VAL	LEU	ALA	ARG	THR	ALA	GLY	ALA	GLN	ALA	ALA	GLY	VAL	ASN	ALA	VAL	VAL	ASN	GLY	LEU	GLY	TYR	PHE	ARG	ILE	LEU	LEU	ARG	ASN	VAL	VAL	LEU	LEU	ASN	ARG	TYR	PHE	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	
GLU	ALA	PRO	ALA	VAL	HIS	SER	ILE	ASP	ILE	ARG	PRO	GLN	THR	ASN	ALA	SER	PHE	PRO	THR	PRO	GLY	THR	GLY	VAL	ILE	ALA	GLN	ASN	VAL	VAL	VAL	VAL	ALA	GLY	THR	TYR	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	
VAL	ARG	THR	THR	VAL	THR	VAL	ILE	ASP	ILE	GLN	LEU	ARG	PRO	THR	GLY	THR	GLY	PRO	TYR	ARG	VAL	THR	GLY	VAL	ILE	VAL	ASN	VAL	ALA	ARG	PHE	LEU	GLY	ARG	GLY	TYR	GLY	THR	GLY	THR	THR	THR	THR	THR	THR	THR	THR	THR	
ILE	GLY	ILE	ASP	GLY	THR	VAL	TYR	HIS	ASP	GLN	PRO	TRP	ARG	THR	VAL	THR	THR	GLY	VAL	PRO	GLY	THR	GLY	ALA	GLY	VAL	VAL	ALA	SER	GLY	ILE	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	CYS
LEU	ALA	TYR	SER	GLY	THR	THR	LEU	THR	SER	ARG	ILE	PRO	PHE	ASP	VAL	HIS	GLY	THR	TYR	VAL	GLY	THR	GLY	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	ARG
ARG	LYS	PHE	GLY	GLY	ALA	GLY	PRO	PRO	ASP	GLY	ILE	PHE	THR	ASP	VAL	ASP	VAL	LEU	ALA	VAL	VAL	THR	ARG	ALA	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	GLY
SER	GLU	LEU	ARG	PRO	VAL	ARG	SER	ARG	SER	ARG	ARG	ILE	GLY	LEU	ARG	ALA	ALA	LEU	LEU	VAL	VAL	PHE	ALA	ALA	LYS	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	LEU
HIS	THR	LEU	VAL	ALA	PRO	ALA	LEU	GLY	THR	ASP	ASP	ASN	VAL	PHE	GLU	CYS	ASP	VAL	SER	VAL	VAL	THR	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	GLY
VAL	GLY	ALA	GLY	ILE	TRP	ALA	TRP	ALA	GLU	ASP	ASP	LEU	ASN	LEU	VAL	TYR	LEU	ASN	SER	HIS	LEU	THR	GLY	ARG	ARG	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	ALA
PRO	PRO	PRO	GLY	ARG	PRO	ARG	PRO	ARG	PRO	LEU	VAL	VAL	VAL	ASP	ARG	ARG	GLN	LEU	GLY	ASP	PRO	ASP	THR	ARG	PHE	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	LEU
SER	ALA	GLU	LEU	SER	ARG	PRO	ARG	PRO	GLY	PRO	GLY	ILE	ASP	LEU	ILE	VAL	VAL	LEU	ASP	PRO	PRO	PHE	ASP	ARG	PRO	PRO	PHE	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	TRP	
SER	SER	ALA	GLY	ARG	PRO	LEU	ARG	ALA	ASP	HIS	ALA	ASN	ALA	PRO	LEU	LEU	VAL	VAL	ASP	PRO	PRO	PHE	ILE	GLY	GLY	PRO	PRO	PRO	PRO	PRO	PRO	PRO	PRO	PRO	PRO	PRO	PRO	PRO	PRO	PRO	PRO	PRO	PRO	PRO	PRO	PRO	PRO	PRO	ALA
THR	GLU	VAL	ARG	ARG																																													

● Molecule 2: ESX-5 secretion system protein EccC5





M1	K2	R3	G4	F5	A6	R7	P8	T9	P10	E11	K12	P13	I16	K17	P18	E19	N20	E23	F28	F72	P73	R86	G87	M88	G89	G90	G91	Q92	Q93	Q94	M95	D123	A127	R130	W131	L139	V143	R147	M148	W149	E150	R151	K152	P153	D154	G155	K156	D157								
L158	N159	F160	G161	V162	V163	G166	R171	P172	E173	V174	T175	Q180	N181	D185	I186	V213	E214	L215	G225	E226	R227	G232	L233	M234	I238	C239	A242	H245	G246	P247	D248	H249	V250	Q251	M252	S256	D257	D258	L259	D260	Q261	W262	D263	K266	W267	L268	P269									
H270	F271	G272	D273	S274	ARG	HIS	ASP	ALA	GLY	ASN	ALA	M285	T288	S289	R290	V291	E292	F293	A294	A295	E296	Q297	E299	L300	F301	A302	G303	R304	G305	S306	F307	T308	P309	R310	H311	A312	S313	S314	S315	A316	Q317	T318	F319	T320	P321	H322	D328	V329	D330	D331	P332	E335				
Y336	V337	I338	S339	A340	E341	G342	V343	D344	G345	V346	T347	F348	F349	D350	L351	T352	G353	S354	S355	M356	W357	T358	D359	I360	P361	E362	R363	Q366	F367	D368	K369	T370	L376	P377	R378	D381	N384	D388	K389	A390	T396	D397	Q398	V399	S400	I401	A402	E403	A404	E405	E406	A412				
Q413	W414	R415	L416	ALA	GLU	ALA	TYR	GLU	GLU	ASP	ILE	ALA	HIS	GLY	ALA	ASP	ASP	ILE	LEU	SER	TYR	TYR	GLY	GLY	ASN	ALA	ASP	ILE	LEU	ASP	ASP	ALA	THR	THR	GLY	SER	GLY	ARG	SER	LEU	THR	ASP	ASP	GLY	ASN	ARG										
SER	ASP	ASN	GLY	GLU	LEU	LEU	PHE	LEU	LEU	ASP	GLY	GLY	GLY	GLY	PRO	HIS	ASP	GLY	VAL	SER	GLY	PRO	GLY	LYS	THR	ASP	THR	LEU	LEU	VAL	THR	THR	THR	LEU	LEU	LEU	LEU	GLU	GLY	VAL	GLY	VAL	LEU	LEU	LEU	LEU	LEU	LEU								
LYS	GLY	GLY	SER	ALA	VAL	LYS	PRO	PHE	ALA	ASP	GLY	ASP	THR	THR	ASP	GLY	GLY	THR	VAL	GLY	THR	GLY	GLY	LEU	THR	THR	THR	VAL	VAL	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR						
VAL	ARG	ALA	ARG	MET	ARG	ARG	GLY	GLN	GLY	ASP	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL					
GLU	SER	ARG	ALA	GLU	LEU	MET	GLU	GLY	VAL	ASP	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL					
TRP	ARG	ASP	TYR	PHE	GLN	PRO	GLY	GLY	VAL	ASP	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL					
SER	ASP	ASP	ILE	GLY	GLY	GLU	GLU	GLY	VAL	ASP	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR				
TRP	HIS	LYS	GLU	TYR	SER	ALA	CYS	ASN	ASN	GLY	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE	ILE			
ALA	ALA	THR	HIS	THR	PRO	GLN	THR	VAL	VAL	PHE	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR	THR			
PHE	LEU	GLU	CYS	GLY	ILE	ALA	SER	MET	GLY	ASP	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY	GLY			
PRO	SER	PHE	GLY	VAL	HIS	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	
VAL	ASN	TYR	VAL	ARG	LEU	ASP	SER	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	
GLU	GLN	VAL	ARG	GLU	LEU	SER	ARG	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP	ASP
SER	GLU	ILE	GLY	ARG	LEU	TYR	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL	VAL

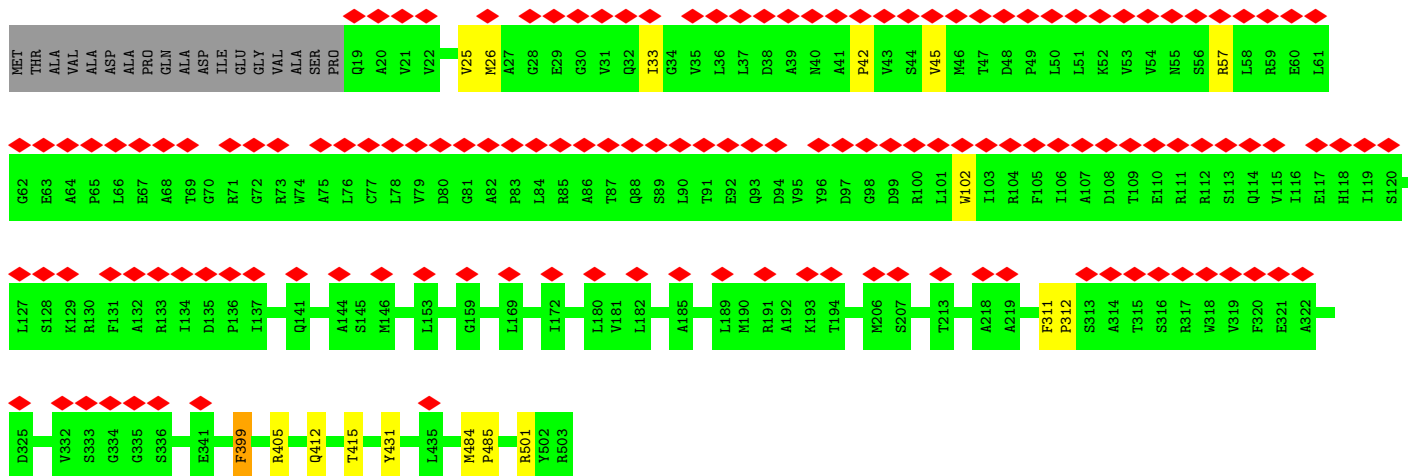




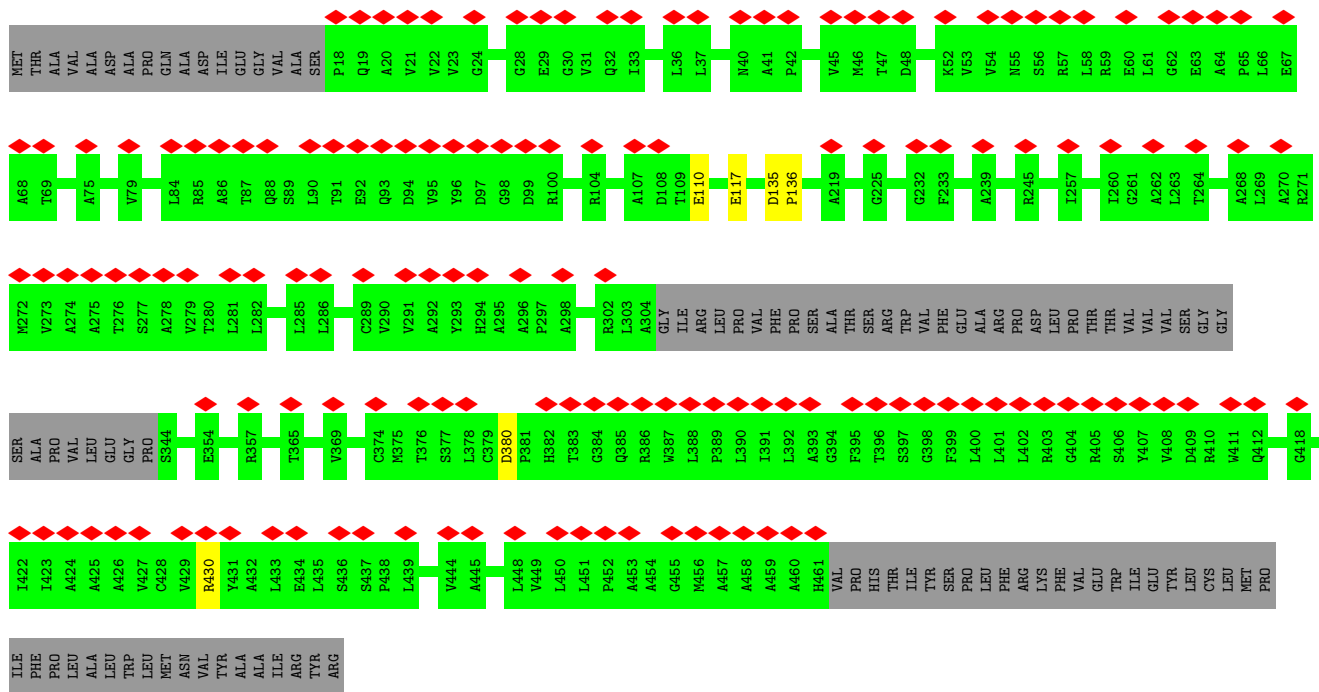
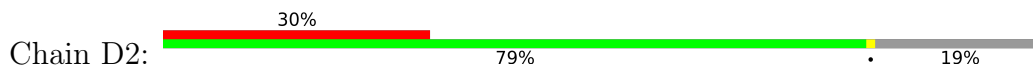




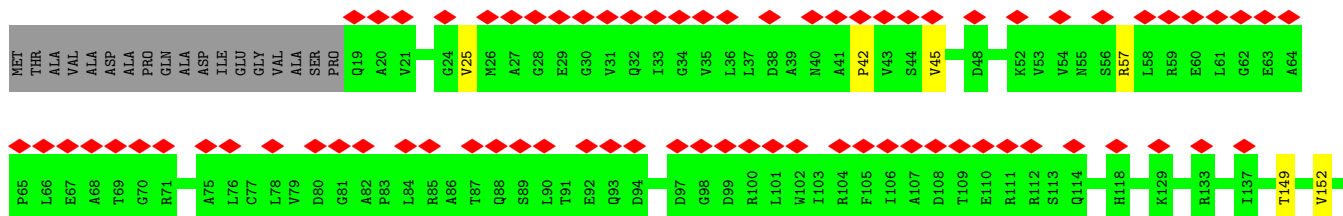


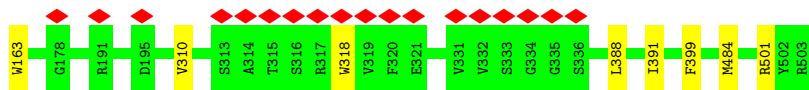


• Molecule 3: ESX-5 secretion system protein EccD5

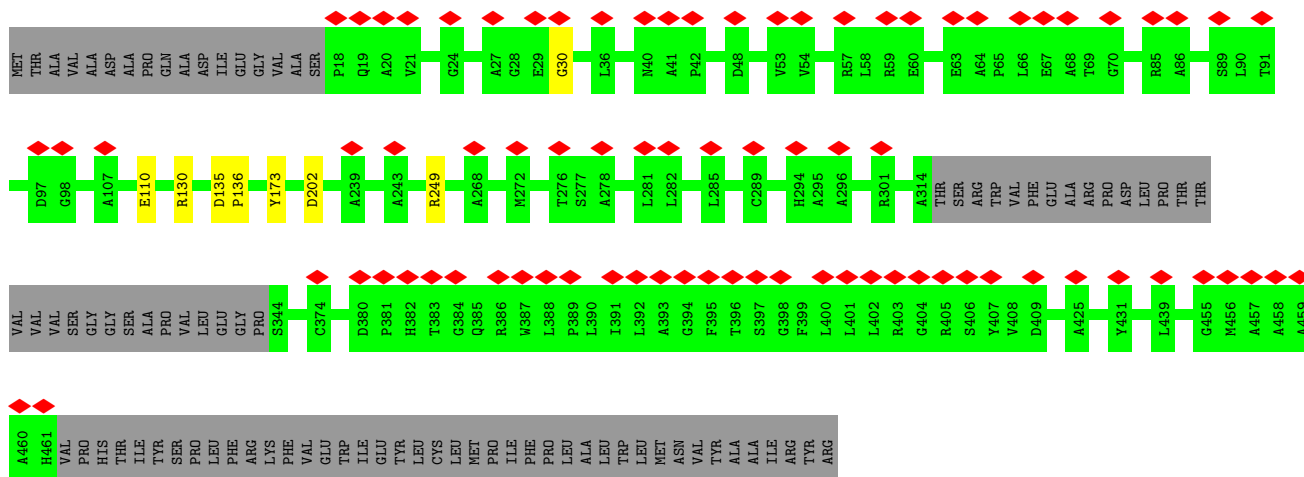
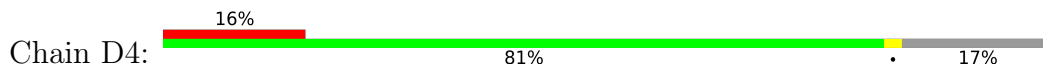


• Molecule 3: ESX-5 secretion system protein EccD5

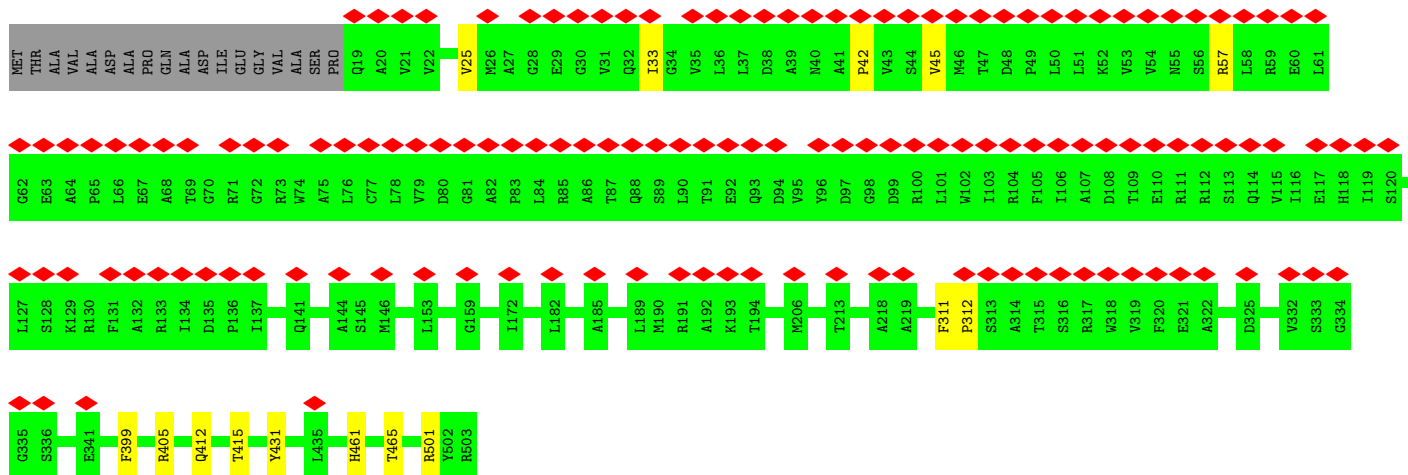




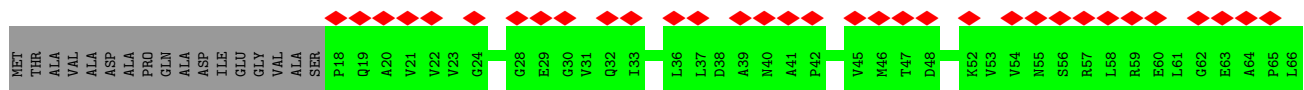
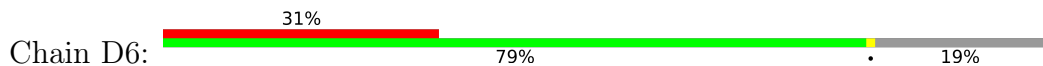
• Molecule 3: ESX-5 secretion system protein EccD5



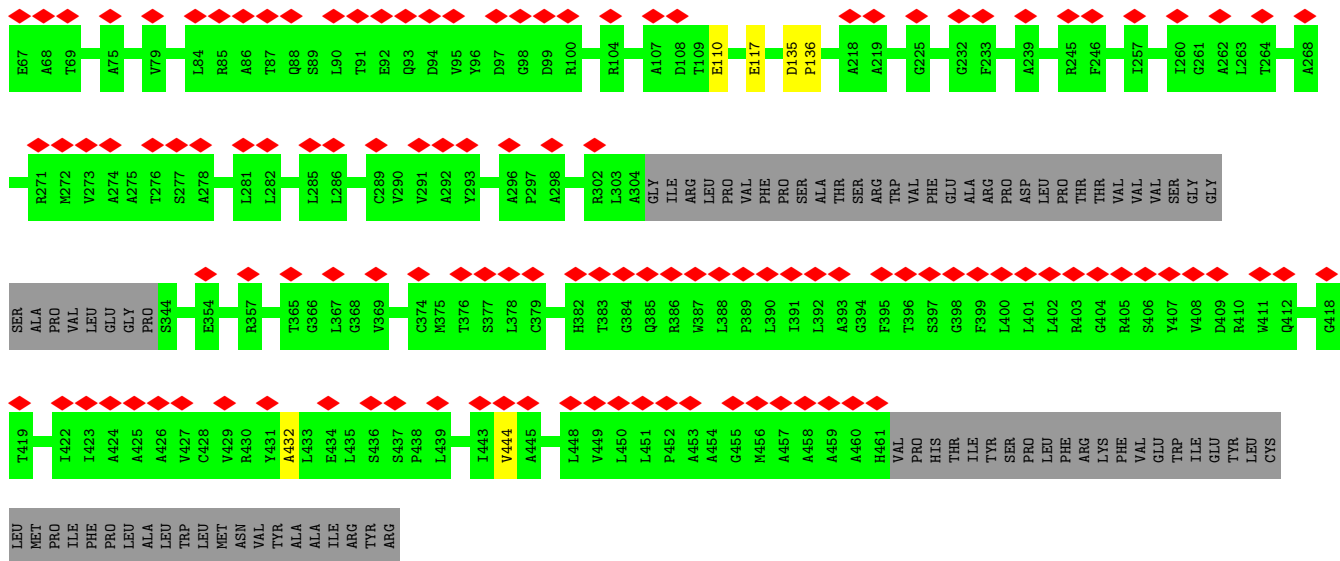
• Molecule 3: ESX-5 secretion system protein EccD5



• Molecule 3: ESX-5 secretion system protein EccD5



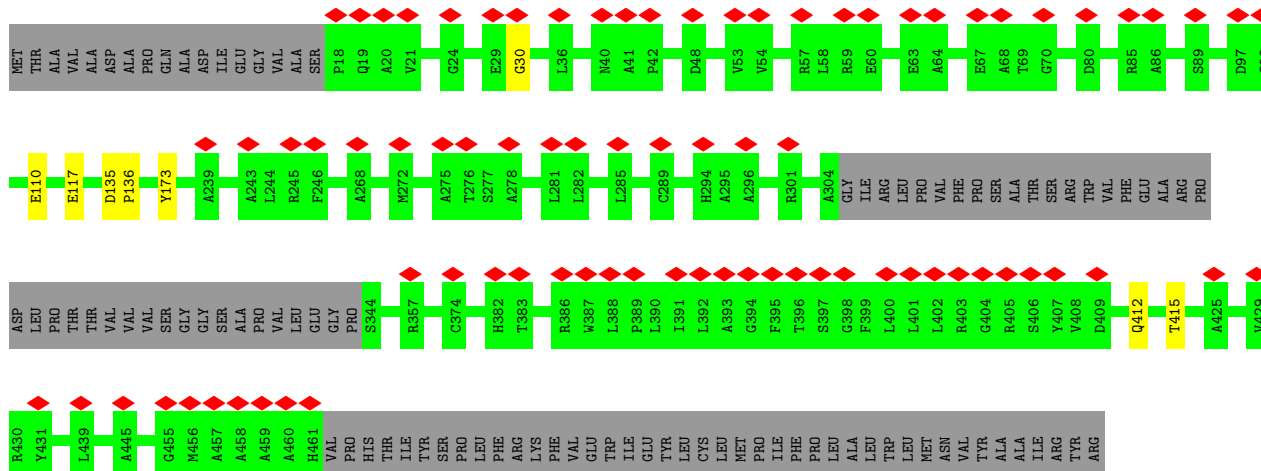
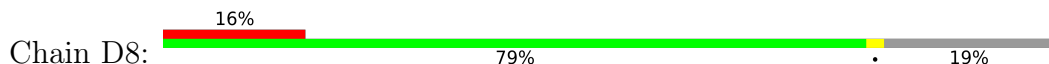




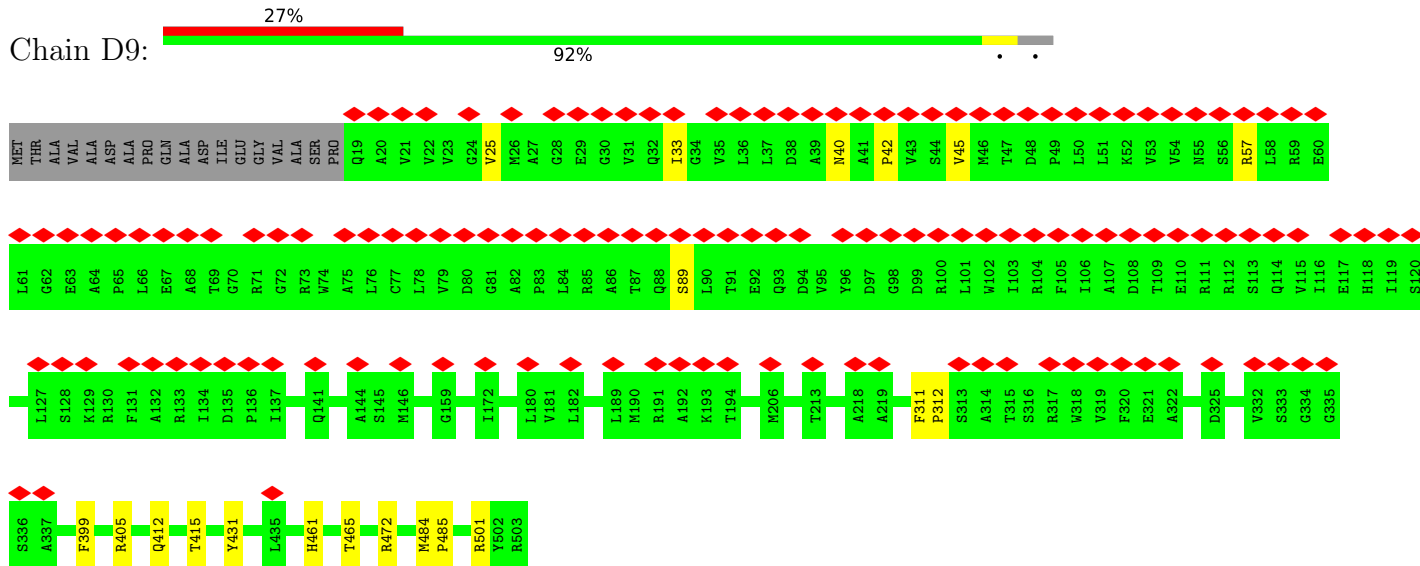
• Molecule 3: ESX-5 secretion system protein EccD5



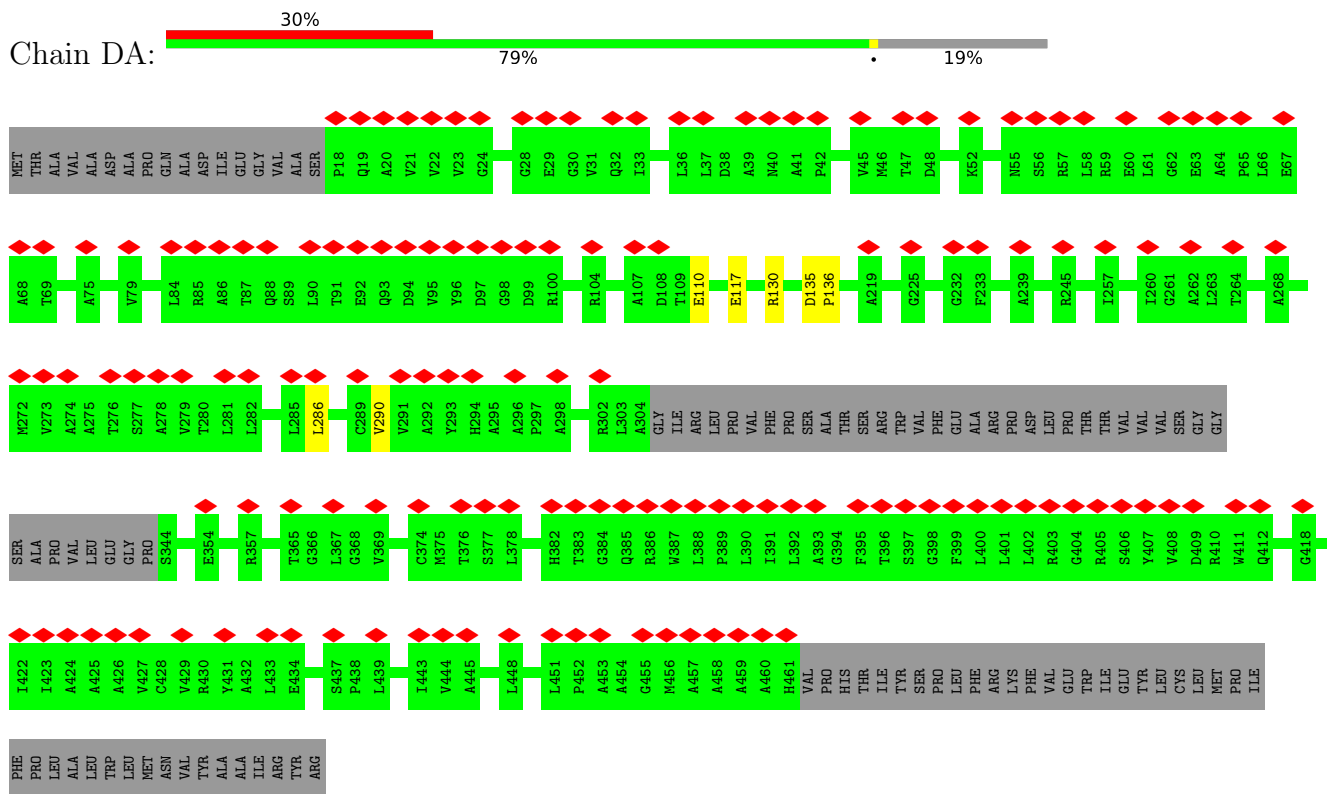
• Molecule 3: ESX-5 secretion system protein EccD5



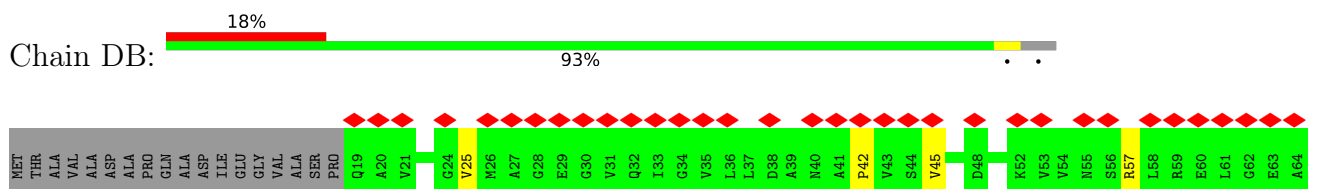
• Molecule 3: ESX-5 secretion system protein EccD5

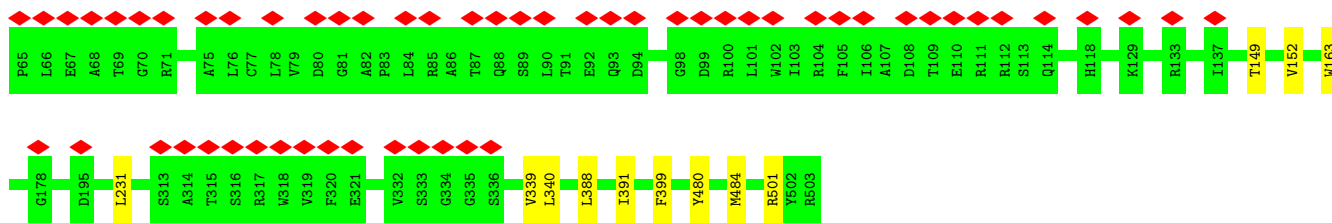


• Molecule 3: ESX-5 secretion system protein EccD5

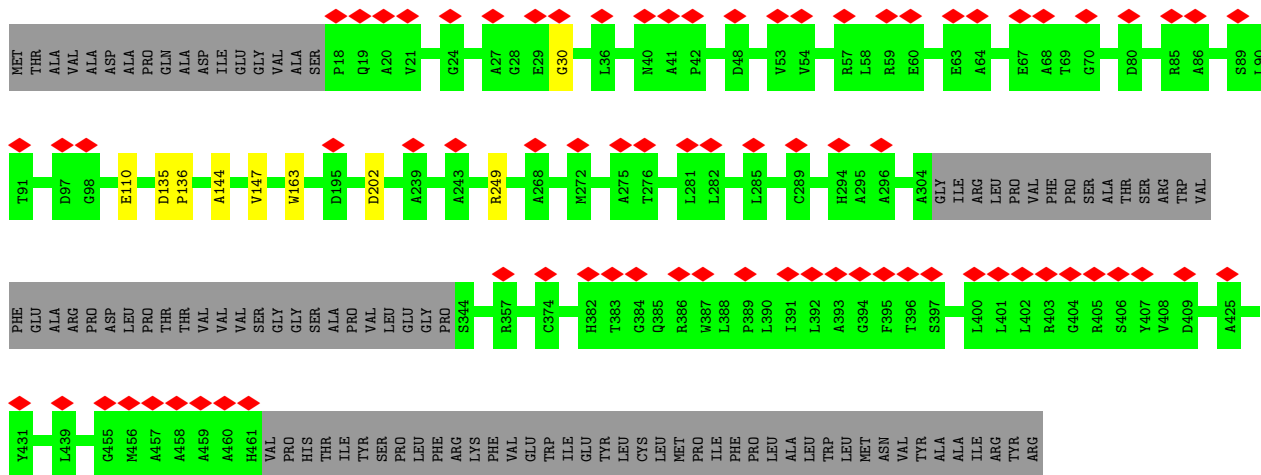
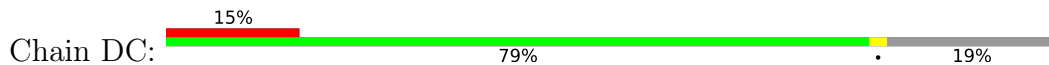


• Molecule 3: ESX-5 secretion system protein EccD5

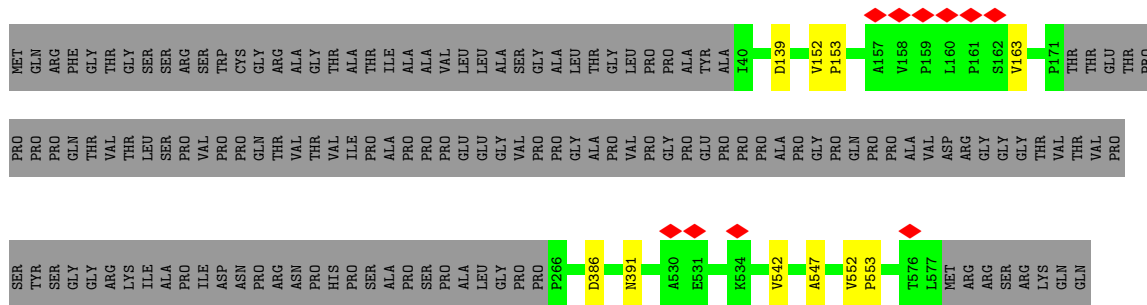
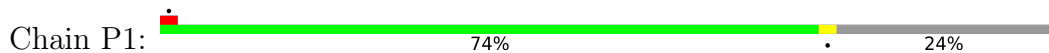




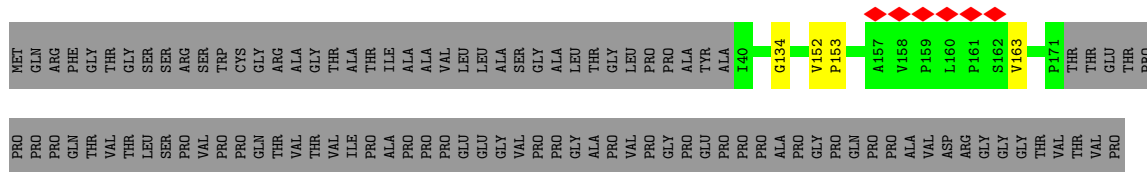
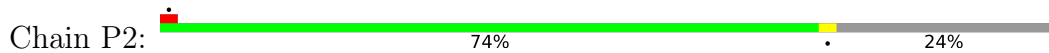
• Molecule 3: ESX-5 secretion system protein EccD5

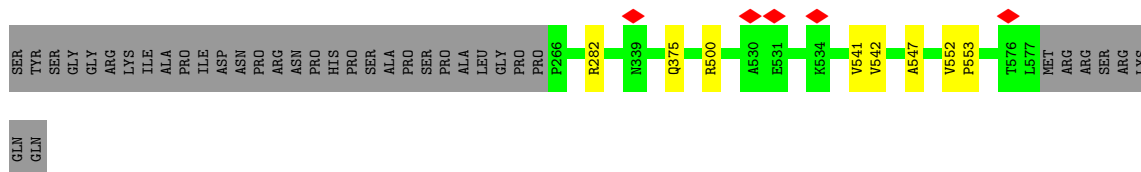


• Molecule 4: Mycosin-5

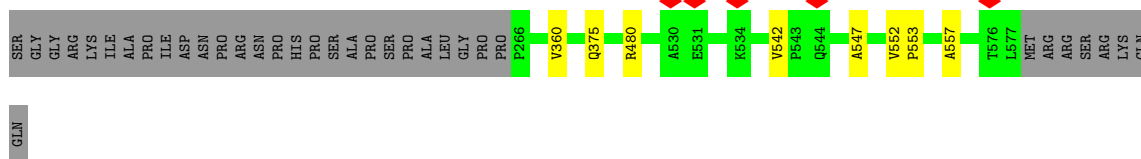
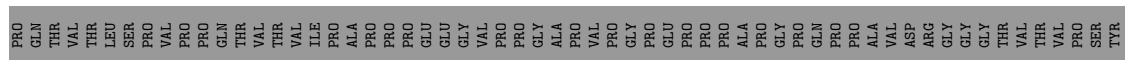
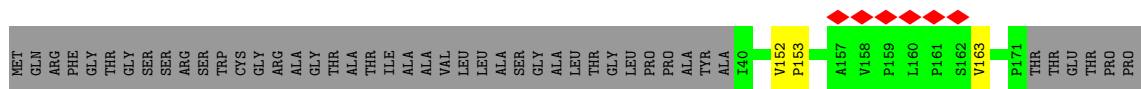
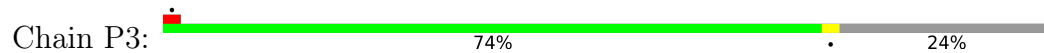


• Molecule 4: Mycosin-5





• Molecule 4: Mycosin-5



## 4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	154929	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ( $e^-/\text{\AA}^2$ )	59.5	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K3 BIOQUANTUM (6k x 4k)	Depositor
Maximum map value	0.136	Depositor
Minimum map value	-0.100	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.003	Depositor
Recommended contour level	0.016	Depositor
Map size (Å)	440.0, 440.0, 440.0	wwPDB
Map dimensions	400, 400, 400	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.1, 1.1, 1.1	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	B1	0.65	14/3669 (0.4%)	0.74	7/5028 (0.1%)
1	B2	0.65	14/3669 (0.4%)	0.74	6/5028 (0.1%)
1	B3	0.43	3/3669 (0.1%)	0.66	0/5028
1	B4	0.42	0/3675	0.65	0/5038
1	B5	0.43	1/3675 (0.0%)	0.67	0/5038
1	B6	0.42	0/3675	0.65	0/5038
2	C1	0.35	0/3280	0.64	0/4459
2	C2	0.34	0/3280	0.63	0/4459
2	C3	0.35	0/3280	0.64	0/4459
2	C4	0.34	0/3280	0.63	0/4459
2	C5	0.35	0/3280	0.63	0/4459
2	C6	0.34	0/3280	0.62	0/4459
3	D1	0.36	0/3710	0.62	0/5078
3	D2	0.31	0/3038	0.58	0/4151
3	D3	0.39	1/3710 (0.0%)	0.64	0/5078
3	D4	0.31	0/3115	0.59	1/4257 (0.0%)
3	D5	0.37	0/3710	0.61	0/5078
3	D6	0.32	0/3038	0.59	0/4151
3	D7	0.40	1/3710 (0.0%)	0.64	0/5078
3	D8	0.31	0/3038	0.60	1/4151 (0.0%)
3	D9	0.36	0/3710	0.62	0/5078
3	DA	0.31	0/3038	0.58	0/4151
3	DB	0.38	0/3710	0.64	0/5078
3	DC	0.31	0/3038	0.59	1/4151 (0.0%)
4	P1	0.55	3/3309 (0.1%)	0.71	0/4545
4	P2	0.55	6/3309 (0.2%)	0.70	0/4545
4	P3	0.56	4/3309 (0.1%)	0.72	0/4545
All	All	0.42	47/92204 (0.1%)	0.65	16/126067 (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	C3	0	1

All (47) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B1	483	ARG	CZ-NH1	-8.63	1.21	1.33
1	B1	483	ARG	CZ-NH2	-8.53	1.22	1.33
1	B2	483	ARG	CZ-NH1	-8.52	1.22	1.33
1	B2	483	ARG	CZ-NH2	-8.17	1.22	1.33
1	B2	103	ARG	CZ-NH2	-7.85	1.22	1.33
1	B2	103	ARG	CZ-NH1	-7.84	1.22	1.33
1	B1	103	ARG	CZ-NH2	-7.84	1.22	1.33
1	B1	103	ARG	CZ-NH1	-7.79	1.23	1.33
4	P3	375	GLN	C-N	6.99	1.50	1.34
4	P2	375	GLN	C-N	6.77	1.49	1.34
1	B1	105	TYR	CD1-CE1	-6.72	1.29	1.39
1	B2	105	TYR	CD1-CE1	-6.67	1.29	1.39
1	B1	489	GLU	CB-CG	-6.51	1.39	1.52
1	B1	105	TYR	CD2-CE2	-6.51	1.29	1.39
1	B2	105	TYR	CD2-CE2	-6.47	1.29	1.39
1	B2	489	GLU	CB-CG	-6.21	1.40	1.52
4	P2	542	VAL	CB-CG1	-5.95	1.40	1.52
1	B2	488	VAL	CB-CG2	-5.88	1.40	1.52
1	B2	100	VAL	CB-CG2	-5.87	1.40	1.52
1	B3	101	GLY	N-CA	-5.87	1.37	1.46
1	B1	100	VAL	CB-CG2	-5.84	1.40	1.52
1	B1	140	VAL	CB-CG1	-5.82	1.40	1.52
1	B2	140	VAL	CB-CG1	-5.82	1.40	1.52
4	P2	541	VAL	CB-CG1	-5.79	1.40	1.52
4	P3	542	VAL	CB-CG2	-5.78	1.40	1.52
1	B1	488	VAL	CB-CG2	-5.75	1.40	1.52
4	P2	541	VAL	CB-CG2	-5.73	1.40	1.52
1	B2	101	GLY	N-CA	-5.72	1.37	1.46
1	B2	488	VAL	CB-CG1	-5.72	1.40	1.52
4	P3	542	VAL	CB-CG1	-5.70	1.40	1.52
1	B1	101	GLY	N-CA	-5.67	1.37	1.46
3	D7	310	VAL	C-N	5.66	1.47	1.34
1	B2	140	VAL	CB-CG2	-5.60	1.41	1.52
1	B3	100	VAL	CB-CG2	-5.56	1.41	1.52
4	P1	542	VAL	CB-CG2	-5.55	1.41	1.52
4	P1	542	VAL	CB-CG1	-5.55	1.41	1.52
1	B1	140	VAL	CB-CG2	-5.54	1.41	1.52
4	P2	542	VAL	CB-CG2	-5.54	1.41	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B1	488	VAL	CB-CG1	-5.53	1.41	1.52
1	B3	100	VAL	CB-CG1	-5.45	1.41	1.52
1	B5	397	SER	CB-OG	-5.28	1.35	1.42
1	B2	100	VAL	CB-CG1	-5.17	1.42	1.52
1	B1	100	VAL	CB-CG1	-5.15	1.42	1.52
3	D3	310	VAL	C-N	5.11	1.45	1.34
4	P2	547	ALA	CA-CB	-5.06	1.41	1.52
4	P3	547	ALA	CA-CB	-5.04	1.41	1.52
4	P1	547	ALA	CA-CB	-5.02	1.42	1.52

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B2	103	ARG	CA-CB-CG	6.89	128.57	113.40
1	B1	103	ARG	CA-CB-CG	6.88	128.53	113.40
1	B1	105	TYR	CB-CG-CD2	6.50	124.90	121.00
1	B2	105	TYR	CB-CG-CD2	6.38	124.83	121.00
1	B1	489	GLU	CA-CB-CG	6.03	126.67	113.40
1	B2	489	GLU	CA-CB-CG	5.92	126.43	113.40
1	B2	483	ARG	NE-CZ-NH1	-5.66	117.47	120.30
1	B1	483	ARG	NE-CZ-NH1	-5.63	117.48	120.30
1	B1	483	ARG	NE-CZ-NH2	5.29	122.94	120.30
1	B2	483	ARG	NE-CZ-NH2	5.24	122.92	120.30
1	B1	103	ARG	NE-CZ-NH1	-5.22	117.69	120.30
3	D8	30	GLY	N-CA-C	5.17	126.03	113.10
3	D4	30	GLY	N-CA-C	5.15	125.99	113.10
3	DC	30	GLY	N-CA-C	5.10	125.85	113.10
1	B2	103	ARG	CD-NE-CZ	5.08	130.71	123.60
1	B1	103	ARG	NE-CZ-NH2	5.04	122.82	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	C3	86	ARG	Sidechain

## 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	B1	3587	3631	3626	7	0
1	B2	3587	3631	3626	6	0
1	B3	3587	3631	3626	8	0
1	B4	3591	3621	3618	7	0
1	B5	3591	3621	3618	6	0
1	B6	3591	3621	3618	4	0
2	C1	3190	3145	3142	10	0
2	C2	3190	3145	3142	11	0
2	C3	3190	3145	3142	11	0
2	C4	3190	3145	3142	9	0
2	C5	3190	3145	3142	13	0
2	C6	3190	3145	3142	8	0
3	D1	3635	3823	3822	8	0
3	D2	2989	3166	3163	3	0
3	D3	3635	3824	3822	6	0
3	D4	3063	3245	3243	3	0
3	D5	3635	3824	3822	6	0
3	D6	2989	3166	3163	3	0
3	D7	3635	3824	3822	10	0
3	D8	2989	3165	3163	3	0
3	D9	3635	3824	3822	11	0
3	DA	2989	3167	3163	3	0
3	DB	3635	3824	3822	8	0
3	DC	2989	3165	3163	4	0
4	P1	3226	3219	3218	5	0
4	P2	3226	3219	3218	5	0
4	P3	3226	3219	3218	6	0
All	All	90170	92300	92228	171	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 1.

All (171) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:P1:552:VAL:HG23	4:P1:553:PRO:HD3	1.77	0.65
2:C5:185:ASP:OD1	2:C5:186:ILE:N	2.32	0.63
2:C4:130:ARG:NH2	3:DA:110:GLU:OE2	2.32	0.62
2:C6:130:ARG:NH2	3:D2:110:GLU:OE2	2.32	0.62
3:D6:432:ALA:HB2	3:D6:444:VAL:HG21	1.83	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B5:328:GLU:O	1:B5:331:THR:HG22	2.04	0.56
4:P3:552:VAL:HG23	4:P3:553:PRO:HD3	1.87	0.56
2:C4:185:ASP:OD1	2:C4:186:ILE:N	2.39	0.56
2:C1:130:ARG:NH2	3:D8:110:GLU:OE2	2.39	0.54
2:C2:185:ASP:OD1	2:C2:186:ILE:N	2.41	0.54
2:C2:130:ARG:NH2	3:D6:110:GLU:OE2	2.41	0.54
2:C3:294:ALA:HA	2:C3:298:ALA:HB3	1.89	0.54
2:C5:130:ARG:NH2	3:D4:110:GLU:OE2	2.42	0.53
3:D5:311:PHE:CG	3:D5:312:PRO:HD2	2.44	0.53
2:C2:320:THR:CG2	2:C2:321:PRO:HD3	2.40	0.52
2:C5:294:ALA:HA	2:C5:298:ALA:HB3	1.91	0.52
1:B5:163:ASP:OD2	1:B5:164:THR:N	2.43	0.52
2:C5:320:THR:CG2	2:C5:321:PRO:HD3	2.39	0.52
3:D1:311:PHE:CG	3:D1:312:PRO:HD2	2.44	0.52
2:C1:320:THR:CG2	2:C1:321:PRO:HD3	2.40	0.52
2:C6:320:THR:CG2	2:C6:321:PRO:HD3	2.39	0.52
1:B3:355:ASP:OD1	1:B3:355:ASP:N	2.41	0.52
2:C4:320:THR:CG2	2:C4:321:PRO:HD3	2.39	0.52
1:B3:385:ILE:HG23	1:B3:386:PRO:HD2	1.92	0.52
2:C6:185:ASP:OD1	2:C6:186:ILE:N	2.43	0.52
4:P2:552:VAL:HG23	4:P2:553:PRO:HD3	1.92	0.52
2:C3:320:THR:CG2	2:C3:321:PRO:HD3	2.40	0.51
2:C5:338:ILE:HD11	2:C5:357:TRP:CH2	2.46	0.51
2:C3:130:ARG:NH2	3:DC:110:GLU:OE2	2.42	0.51
2:C1:338:ILE:HD11	2:C1:357:TRP:CH2	2.46	0.51
2:C3:358:THR:O	2:C3:358:THR:HG22	2.11	0.51
3:D9:311:PHE:CG	3:D9:312:PRO:HD2	2.45	0.50
2:C4:320:THR:HG23	2:C4:321:PRO:HD3	1.94	0.50
2:C5:358:THR:HG22	2:C5:358:THR:O	2.12	0.50
2:C2:358:THR:O	2:C2:358:THR:HG22	2.12	0.49
2:C1:358:THR:HG22	2:C1:358:THR:O	2.11	0.49
3:D8:135:ASP:HB2	3:D8:136:PRO:HD2	1.95	0.49
2:C4:358:THR:HG22	2:C4:358:THR:O	2.13	0.49
2:C2:320:THR:HG23	2:C2:321:PRO:HD3	1.96	0.48
2:C6:320:THR:HG23	2:C6:321:PRO:HD3	1.95	0.48
3:D1:25:VAL:N	3:D1:33:ILE:O	2.46	0.48
2:C6:358:THR:HG22	2:C6:358:THR:O	2.14	0.48
2:C1:294:ALA:HA	2:C1:298:ALA:HB3	1.94	0.47
1:B2:497:MET:O	1:B2:498:THR:HG22	2.15	0.47
3:DA:135:ASP:HB2	3:DA:136:PRO:HD2	1.95	0.47
4:P3:360:VAL:HG23	4:P3:480:ARG:HH21	1.79	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B1:385:ILE:HG23	1:B1:386:PRO:HD2	1.96	0.47
4:P2:163:VAL:O	4:P2:163:VAL:HG13	2.15	0.47
2:C3:338:ILE:HD11	2:C3:357:TRP:CH2	2.50	0.46
2:C5:71:ILE:HG23	2:C5:75:PHE:CZ	2.50	0.46
3:D7:42:PRO:O	3:D7:45:VAL:HG22	2.16	0.46
3:DB:231:LEU:HD11	4:P3:557:ALA:HA	1.98	0.46
2:C3:175:THR:HG23	2:C3:175:THR:O	2.16	0.46
1:B3:145:ALA:HB1	1:B3:146:PRO:HD2	1.98	0.46
1:B2:385:ILE:HG23	1:B2:386:PRO:HD2	1.98	0.46
1:B4:145:ALA:HB1	1:B4:146:PRO:HD2	1.98	0.46
1:B6:145:ALA:HB1	1:B6:146:PRO:HD2	1.99	0.46
1:B4:355:ASP:OD1	1:B4:355:ASP:N	2.43	0.45
3:D4:135:ASP:HB2	3:D4:136:PRO:HD2	1.98	0.45
4:P3:552:VAL:CG2	4:P3:553:PRO:HD3	2.46	0.45
1:B2:59:SER:OG	3:D7:484:MET:HA	2.16	0.45
3:D9:25:VAL:N	3:D9:33:ILE:O	2.48	0.45
1:B2:145:ALA:HB1	1:B2:146:PRO:HD2	1.98	0.45
4:P1:163:VAL:O	4:P1:163:VAL:HG13	2.16	0.45
3:D5:25:VAL:N	3:D5:33:ILE:O	2.47	0.45
3:D9:412:GLN:O	3:D9:415:THR:HG22	2.16	0.45
2:C3:338:ILE:HD11	2:C3:357:TRP:CZ3	2.52	0.44
2:C5:338:ILE:HD11	2:C5:357:TRP:CZ3	2.52	0.44
4:P3:163:VAL:O	4:P3:163:VAL:HG13	2.17	0.44
2:C5:175:THR:HG23	2:C5:175:THR:O	2.17	0.44
1:B1:59:SER:OG	3:DB:484:MET:HA	2.17	0.44
3:D7:192:ALA:HA	3:D7:197:ASP:OD2	2.17	0.44
3:DB:42:PRO:O	3:DB:45:VAL:HG22	2.17	0.44
3:D9:40:ASN:HA	3:D9:89:SER:HB3	1.99	0.44
4:P3:152:VAL:HG13	4:P3:153:PRO:HD2	1.99	0.44
1:B4:304:THR:HG22	1:B4:305:LEU:N	2.33	0.44
4:P2:552:VAL:CG2	4:P2:553:PRO:HD3	2.47	0.44
2:C1:175:THR:O	2:C1:175:THR:HG23	2.17	0.44
3:D2:135:ASP:HB2	3:D2:136:PRO:HD2	2.00	0.44
1:B2:213:ARG:NE	1:B2:214:GLU:OE2	2.46	0.44
2:C4:294:ALA:HA	2:C4:298:ALA:HB3	2.00	0.44
2:C6:294:ALA:HA	2:C6:298:ALA:HB3	1.98	0.44
1:B5:268:GLY:O	1:B5:279:ILE:HG22	2.18	0.44
3:D3:42:PRO:O	3:D3:45:VAL:HG22	2.18	0.44
4:P1:552:VAL:HG23	4:P1:553:PRO:CD	2.46	0.44
1:B2:355:ASP:OD1	1:B2:355:ASP:N	2.41	0.44
2:C5:320:THR:HG23	2:C5:321:PRO:HD3	2.00	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D1:484:MET:HB3	3:D1:485:PRO:HD3	2.00	0.44
4:P1:152:VAL:HG13	4:P1:153:PRO:HD2	1.99	0.44
2:C5:97:ARG:HB3	2:C5:98:PRO:HD3	2.00	0.43
1:B3:297:VAL:HG13	1:B3:297:VAL:O	2.18	0.43
1:B3:338:VAL:HG12	1:B3:340:ARG:H	1.84	0.43
3:D5:412:GLN:O	3:D5:415:THR:HG22	2.18	0.43
2:C6:175:THR:O	2:C6:175:THR:HG23	2.18	0.43
3:D6:135:ASP:HB2	3:D6:136:PRO:HD2	2.00	0.43
3:DC:202:ASP:OD1	3:DC:249:ARG:NH2	2.45	0.43
1:B1:145:ALA:HB1	1:B1:146:PRO:HD2	1.99	0.43
2:C4:175:THR:HG23	2:C4:175:THR:O	2.18	0.43
3:D5:42:PRO:O	3:D5:45:VAL:HG22	2.17	0.43
1:B3:59:SER:OG	3:D3:484:MET:HA	2.18	0.43
3:D9:42:PRO:O	3:D9:45:VAL:HG22	2.19	0.43
1:B3:481:LEU:HD12	1:B3:481:LEU:N	2.33	0.43
3:DC:135:ASP:HB2	3:DC:136:PRO:HD2	1.99	0.43
4:P2:152:VAL:HG13	4:P2:153:PRO:HD2	2.01	0.43
1:B1:16:GLY:O	3:D9:472:ARG:HD2	2.19	0.43
2:C1:338:ILE:HD11	2:C1:357:TRP:CZ3	2.54	0.43
1:B1:163:ASP:C	1:B1:163:ASP:OD2	2.58	0.43
1:B4:338:VAL:CG1	1:B4:339:ASN:N	2.82	0.42
2:C6:320:THR:HG23	2:C6:321:PRO:CD	2.49	0.42
2:C2:294:ALA:HA	2:C2:298:ALA:HB3	2.00	0.42
2:C3:320:THR:HG23	2:C3:321:PRO:HD3	2.01	0.42
2:C4:320:THR:HG23	2:C4:321:PRO:CD	2.48	0.42
3:D2:380:ASP:OD2	3:D2:430:ARG:NH2	2.52	0.42
3:D9:311:PHE:CD2	3:D9:312:PRO:HD2	2.54	0.42
3:D7:25:VAL:HG13	3:D7:25:VAL:O	2.20	0.42
3:DB:25:VAL:O	3:DB:25:VAL:HG13	2.20	0.42
1:B4:268:GLY:O	1:B4:279:ILE:HG22	2.20	0.42
3:D5:461:HIS:CE1	3:D5:465:THR:HG21	2.55	0.42
3:D9:484:MET:HB3	3:D9:485:PRO:HD3	2.01	0.42
1:B5:145:ALA:HB1	1:B5:146:PRO:HD2	2.01	0.42
2:C2:86:ARG:HH21	2:C2:86:ARG:HG3	1.85	0.42
2:C5:219:PRO:HD2	2:C5:363:ARG:NH1	2.35	0.42
3:D1:42:PRO:O	3:D1:45:VAL:HG22	2.20	0.42
3:D5:25:VAL:O	3:D5:25:VAL:HG13	2.20	0.42
3:DC:144:ALA:O	3:DC:147:VAL:HG12	2.20	0.42
2:C1:320:THR:HG23	2:C1:321:PRO:HD3	2.01	0.42
3:D7:339:VAL:HG12	3:D7:340:LEU:N	2.34	0.42
3:D7:480:TYR:N	3:D7:480:TYR:CD1	2.86	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:DB:339:VAL:HG12	3:DB:340:LEU:N	2.35	0.42
3:D1:25:VAL:HG13	3:D1:25:VAL:O	2.20	0.42
3:D1:412:GLN:O	3:D1:415:THR:HG22	2.20	0.42
3:D3:25:VAL:O	3:D3:25:VAL:HG13	2.19	0.42
2:C2:175:THR:O	2:C2:175:THR:HG23	2.19	0.42
3:DB:388:LEU:O	3:DB:391:ILE:HG22	2.19	0.42
1:B6:304:THR:HG22	1:B6:305:LEU:N	2.35	0.41
2:C3:219:PRO:HD2	2:C3:363:ARG:NH1	2.35	0.41
3:D7:340:LEU:O	3:D7:340:LEU:HD12	2.20	0.41
1:B4:59:SER:OG	3:D9:484:MET:HA	2.19	0.41
3:DB:480:TYR:N	3:DB:480:TYR:CD1	2.85	0.41
3:D3:149:THR:O	3:D3:152:VAL:HG22	2.20	0.41
3:D9:461:HIS:CE1	3:D9:465:THR:HG21	2.55	0.41
1:B6:268:GLY:N	1:B6:279:ILE:HG22	2.36	0.41
1:B5:267:GLY:N	1:B5:279:ILE:HG23	2.36	0.41
2:C2:72:PHE:HB2	2:C2:73:PRO:HD3	2.03	0.41
2:C2:320:THR:HG23	2:C2:321:PRO:CD	2.50	0.41
2:C3:63:HIS:O	2:C3:63:HIS:ND1	2.54	0.41
3:D9:25:VAL:O	3:D9:25:VAL:HG13	2.20	0.41
3:D1:399:PHE:CD1	3:D1:399:PHE:C	2.94	0.41
1:B3:234:THR:HG23	1:B3:235:PRO:HD2	2.03	0.41
2:C1:219:PRO:HD2	2:C1:363:ARG:NH1	2.35	0.41
3:D1:26:MET:HG3	3:D1:102:TRP:CE2	2.56	0.41
4:P2:134:GLY:HA2	4:P2:282:ARG:HB2	2.02	0.41
1:B6:268:GLY:O	1:B6:279:ILE:HG22	2.21	0.41
2:C4:72:PHE:HB2	2:C4:73:PRO:HD3	2.03	0.41
4:P1:386:ASP:OD2	4:P1:386:ASP:N	2.52	0.41
2:C1:97:ARG:HB3	2:C1:98:PRO:HD3	2.03	0.41
3:D8:412:GLN:O	3:D8:415:THR:HG22	2.20	0.41
2:C3:320:THR:HG23	2:C3:321:PRO:CD	2.52	0.40
3:DA:286:LEU:O	3:DA:290:VAL:HG23	2.21	0.40
1:B1:421:VAL:HG11	1:B1:467:ALA:HB3	2.03	0.40
1:B5:285:THR:OG1	1:B5:286:PRO:HD2	2.21	0.40
2:C5:182:MET:SD	3:D3:318:TRP:CZ2	3.14	0.40
3:D3:388:LEU:O	3:D3:391:ILE:HG22	2.21	0.40
3:D4:202:ASP:OD1	3:D4:249:ARG:NH2	2.54	0.40
3:D7:388:LEU:O	3:D7:391:ILE:HG22	2.21	0.40
1:B1:481:LEU:N	1:B1:481:LEU:HD12	2.36	0.40
3:D7:149:THR:O	3:D7:152:VAL:HG22	2.21	0.40
3:DB:149:THR:O	3:DB:152:VAL:HG22	2.20	0.40
1:B4:356:ILE:HD12	1:B4:356:ILE:H	1.86	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:D7:412:GLN:O	3:D7:415:THR:HG22	2.22	0.40
2:C2:13:PRO:HB3	2:C2:131:TRP:CZ3	2.57	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	B1	470/506 (93%)	460 (98%)	10 (2%)	0	100	100
1	B2	470/506 (93%)	466 (99%)	4 (1%)	0	100	100
1	B3	470/506 (93%)	457 (97%)	13 (3%)	0	100	100
1	B4	476/506 (94%)	470 (99%)	6 (1%)	0	100	100
1	B5	476/506 (94%)	467 (98%)	9 (2%)	0	100	100
1	B6	476/506 (94%)	470 (99%)	6 (1%)	0	100	100
2	C1	402/1391 (29%)	391 (97%)	11 (3%)	0	100	100
2	C2	402/1391 (29%)	393 (98%)	8 (2%)	1 (0%)	47	78
2	C3	402/1391 (29%)	390 (97%)	12 (3%)	0	100	100
2	C4	402/1391 (29%)	389 (97%)	13 (3%)	0	100	100
2	C5	402/1391 (29%)	393 (98%)	9 (2%)	0	100	100
2	C6	402/1391 (29%)	389 (97%)	13 (3%)	0	100	100
3	D1	483/503 (96%)	476 (99%)	7 (1%)	0	100	100
3	D2	401/503 (80%)	392 (98%)	9 (2%)	0	100	100
3	D3	483/503 (96%)	473 (98%)	10 (2%)	0	100	100
3	D4	411/503 (82%)	404 (98%)	7 (2%)	0	100	100
3	D5	483/503 (96%)	473 (98%)	10 (2%)	0	100	100
3	D6	401/503 (80%)	394 (98%)	7 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
3	D7	483/503 (96%)	472 (98%)	11 (2%)	0	100	100
3	D8	401/503 (80%)	393 (98%)	8 (2%)	0	100	100
3	D9	483/503 (96%)	475 (98%)	8 (2%)	0	100	100
3	DA	401/503 (80%)	393 (98%)	8 (2%)	0	100	100
3	DB	483/503 (96%)	472 (98%)	11 (2%)	0	100	100
3	DC	401/503 (80%)	393 (98%)	8 (2%)	0	100	100
4	P1	440/585 (75%)	419 (95%)	21 (5%)	0	100	100
4	P2	440/585 (75%)	424 (96%)	16 (4%)	0	100	100
4	P3	440/585 (75%)	422 (96%)	18 (4%)	0	100	100
All	All	11884/19173 (62%)	11610 (98%)	273 (2%)	1 (0%)	100	100

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	C2	155	GLY

### 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	B1	390/411 (95%)	389 (100%)	1 (0%)	92	96
1	B2	390/411 (95%)	389 (100%)	1 (0%)	92	96
1	B3	390/411 (95%)	389 (100%)	1 (0%)	92	96
1	B4	389/411 (95%)	384 (99%)	5 (1%)	69	82
1	B5	389/411 (95%)	385 (99%)	4 (1%)	76	86
1	B6	389/411 (95%)	387 (100%)	2 (0%)	88	94
2	C1	342/1137 (30%)	340 (99%)	2 (1%)	86	92
2	C2	342/1137 (30%)	339 (99%)	3 (1%)	78	88
2	C3	342/1137 (30%)	340 (99%)	2 (1%)	86	92

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
2	C4	342/1137 (30%)	339 (99%)	3 (1%)	78	88
2	C5	342/1137 (30%)	338 (99%)	4 (1%)	71	84
2	C6	342/1137 (30%)	340 (99%)	2 (1%)	86	92
3	D1	381/393 (97%)	376 (99%)	5 (1%)	69	82
3	D2	311/393 (79%)	310 (100%)	1 (0%)	92	96
3	D3	381/393 (97%)	377 (99%)	4 (1%)	76	86
3	D4	319/393 (81%)	317 (99%)	2 (1%)	86	92
3	D5	381/393 (97%)	376 (99%)	5 (1%)	69	82
3	D6	311/393 (79%)	310 (100%)	1 (0%)	92	96
3	D7	381/393 (97%)	377 (99%)	4 (1%)	76	86
3	D8	311/393 (79%)	309 (99%)	2 (1%)	86	92
3	D9	381/393 (97%)	376 (99%)	5 (1%)	69	82
3	DA	311/393 (79%)	309 (99%)	2 (1%)	86	92
3	DB	381/393 (97%)	377 (99%)	4 (1%)	76	86
3	DC	311/393 (79%)	310 (100%)	1 (0%)	92	96
4	P1	343/453 (76%)	341 (99%)	2 (1%)	86	92
4	P2	343/453 (76%)	342 (100%)	1 (0%)	92	96
4	P3	343/453 (76%)	343 (100%)	0	100	100
All	All	9578/15363 (62%)	9509 (99%)	69 (1%)	84	91

All (69) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B1	406	ARG
1	B2	406	ARG
1	B3	406	ARG
1	B4	73	TRP
1	B4	193	GLN
1	B4	242	ARG
1	B4	406	ARG
1	B4	485	ASP
1	B5	91	ARG
1	B5	193	GLN
1	B5	285	THR
1	B5	332	LEU
1	B6	193	GLN

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	B6	285	THR
2	C1	151	ARG
2	C1	336	TYR
2	C2	58	PHE
2	C2	151	ARG
2	C2	336	TYR
2	C3	151	ARG
2	C3	336	TYR
2	C4	37	TRP
2	C4	58	PHE
2	C4	151	ARG
2	C5	38	TRP
2	C5	86	ARG
2	C5	151	ARG
2	C5	336	TYR
2	C6	58	PHE
2	C6	151	ARG
3	D1	57	ARG
3	D1	399	PHE
3	D1	405	ARG
3	D1	431	TYR
3	D1	501	ARG
3	D2	117	GLU
3	D3	57	ARG
3	D3	163	TRP
3	D3	399	PHE
3	D3	501	ARG
3	D4	130	ARG
3	D4	173	TYR
3	D5	57	ARG
3	D5	399	PHE
3	D5	405	ARG
3	D5	431	TYR
3	D5	501	ARG
3	D6	117	GLU
3	D7	57	ARG
3	D7	340	LEU
3	D7	399	PHE
3	D7	501	ARG
3	D8	117	GLU
3	D8	173	TYR
3	D9	57	ARG

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Mol	Chain	Res	Type
3	D9	399	PHE
3	D9	405	ARG
3	D9	431	TYR
3	D9	501	ARG
3	DA	117	GLU
3	DA	130	ARG
3	DB	57	ARG
3	DB	163	TRP
3	DB	399	PHE
3	DB	501	ARG
3	DC	163	TRP
4	P1	139	ASP
4	P1	391	ASN
4	P2	500	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	B1	490	HIS
1	B2	339	ASN
1	B2	490	HIS
1	B4	83	ASN
2	C6	133	HIS
3	D1	165	HIS
3	D4	118	HIS
3	D7	165	HIS
4	P1	391	ASN
4	P1	450	ASN
4	P2	283	GLN
4	P2	391	ASN
4	P3	391	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 monosaccharides 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.

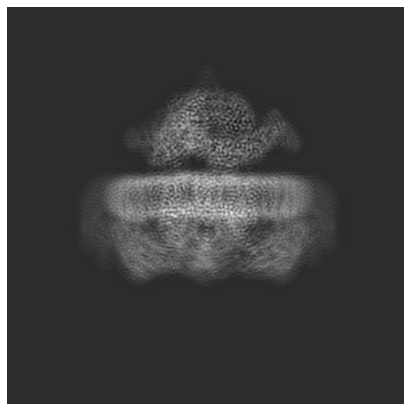
## 6 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-12517. These allow visual inspection of the internal detail of the map and identification of artifacts.

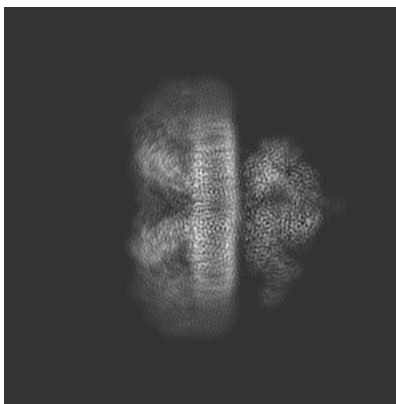
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

### 6.1 Orthogonal projections [i](#)

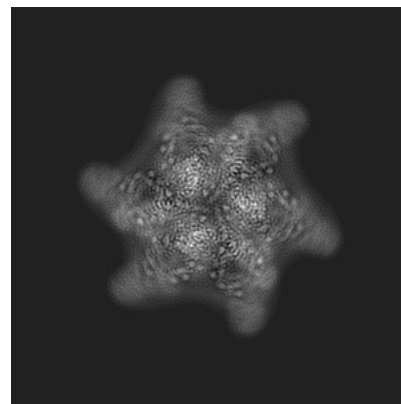
#### 6.1.1 Primary map



X

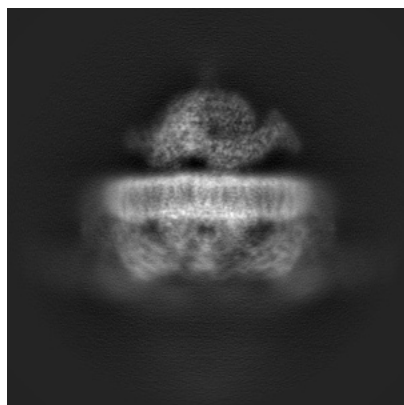


Y

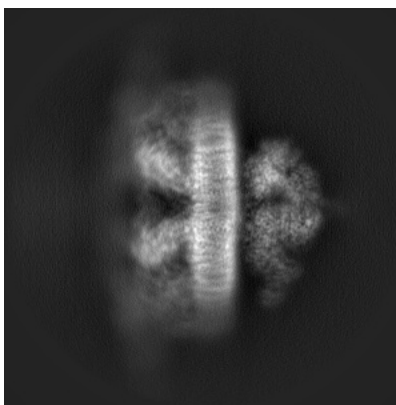


Z

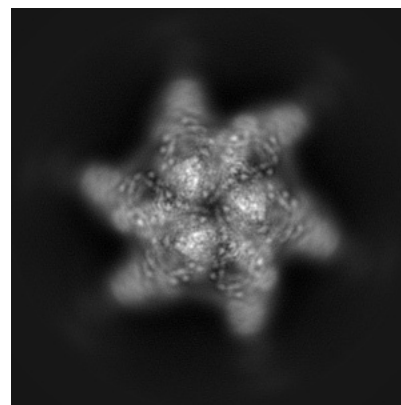
#### 6.1.2 Raw map



X



Y

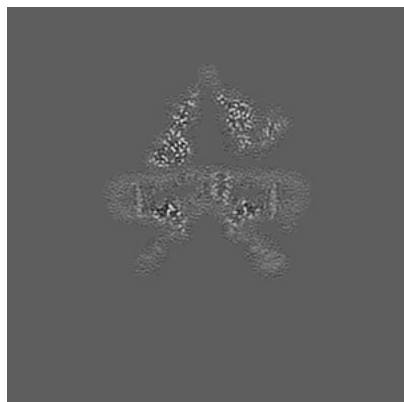


Z

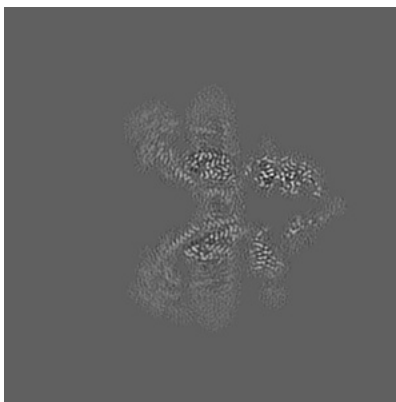
The images above show the map projected in three orthogonal directions.

## 6.2 Central slices [i](#)

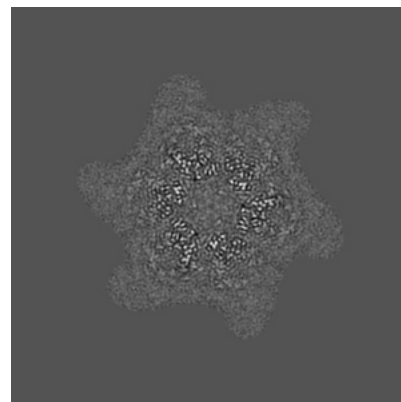
### 6.2.1 Primary map



X Index: 200

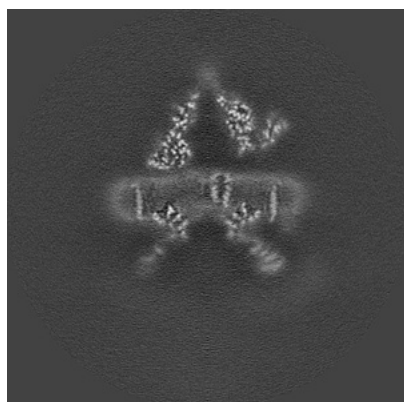


Y Index: 200

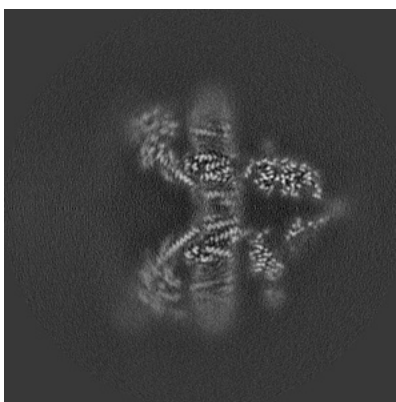


Z Index: 200

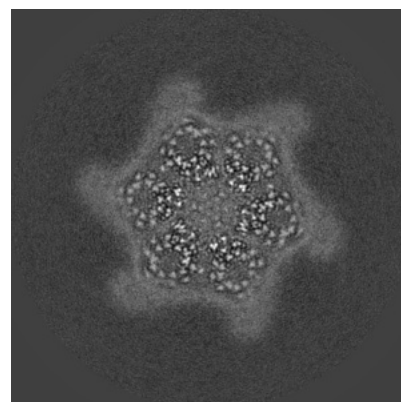
### 6.2.2 Raw map



X Index: 200



Y Index: 200

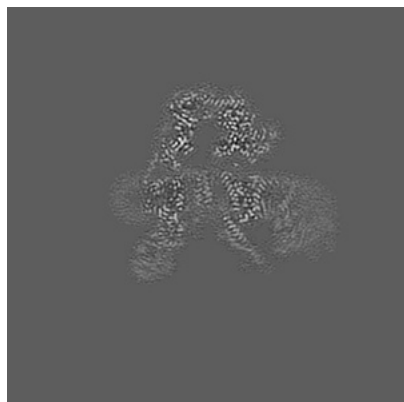


Z Index: 200

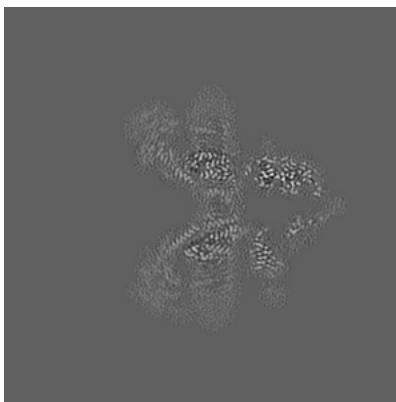
The images above show central slices of the map in three orthogonal directions.

## 6.3 Largest variance slices [i](#)

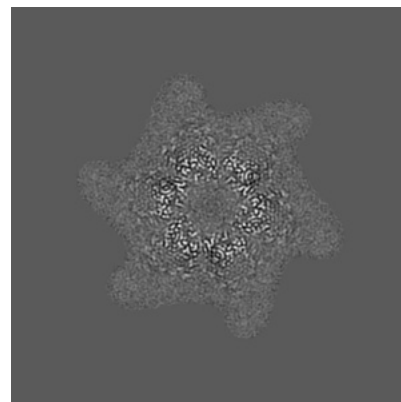
### 6.3.1 Primary map



X Index: 184

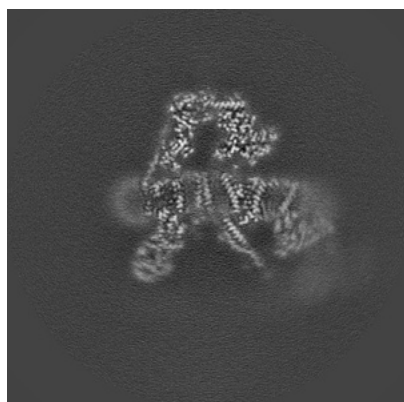


Y Index: 200

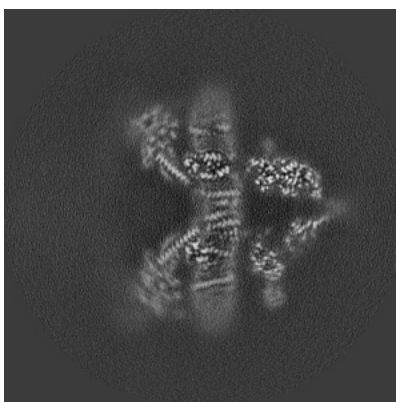


Z Index: 197

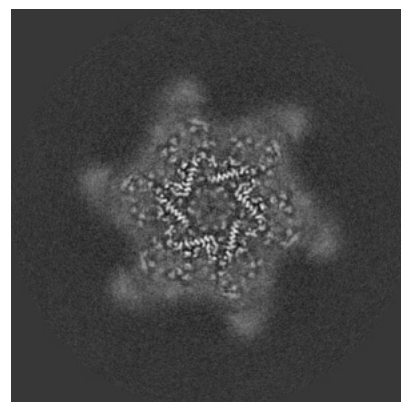
### 6.3.2 Raw map



X Index: 184



Y Index: 198

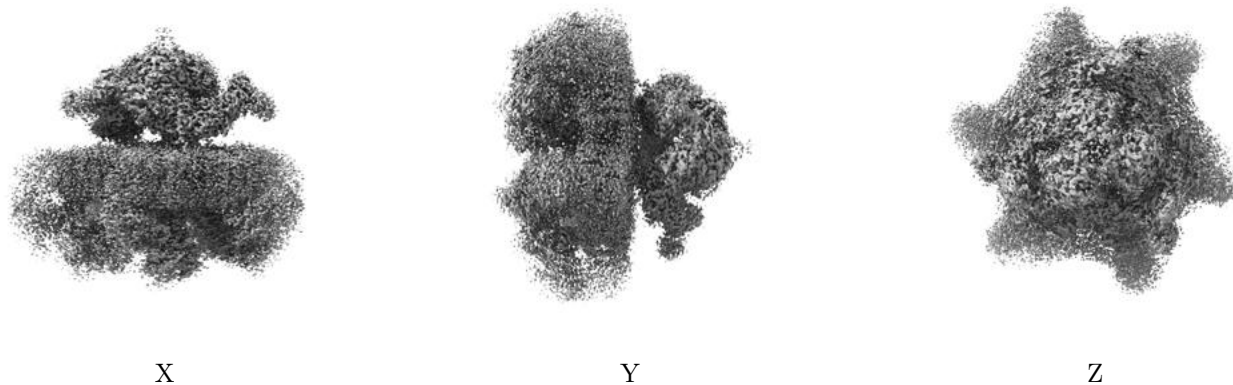


Z Index: 192

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

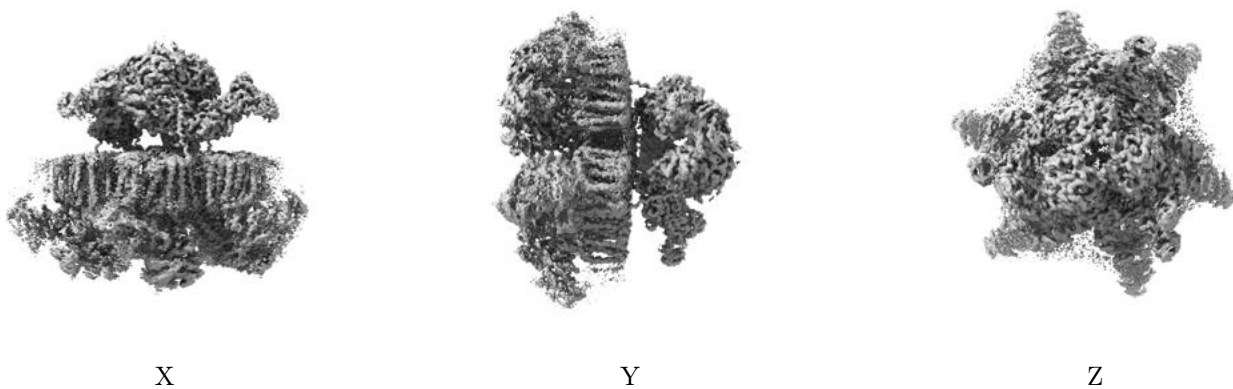
## 6.4 Orthogonal surface views [i](#)

### 6.4.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 0.016. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

### 6.4.2 Raw map



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.

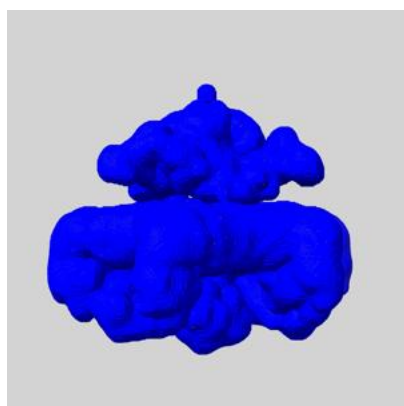
## 6.5 Mask visualisation [i](#)

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

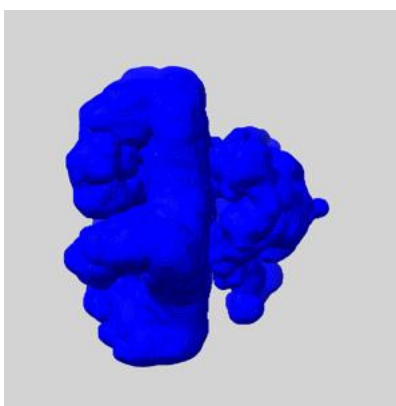
A mask typically either:

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

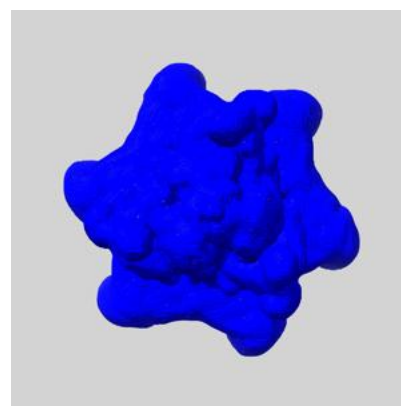
### 6.5.1 emd\_12517\_msk\_1.map [i](#)



X



Y



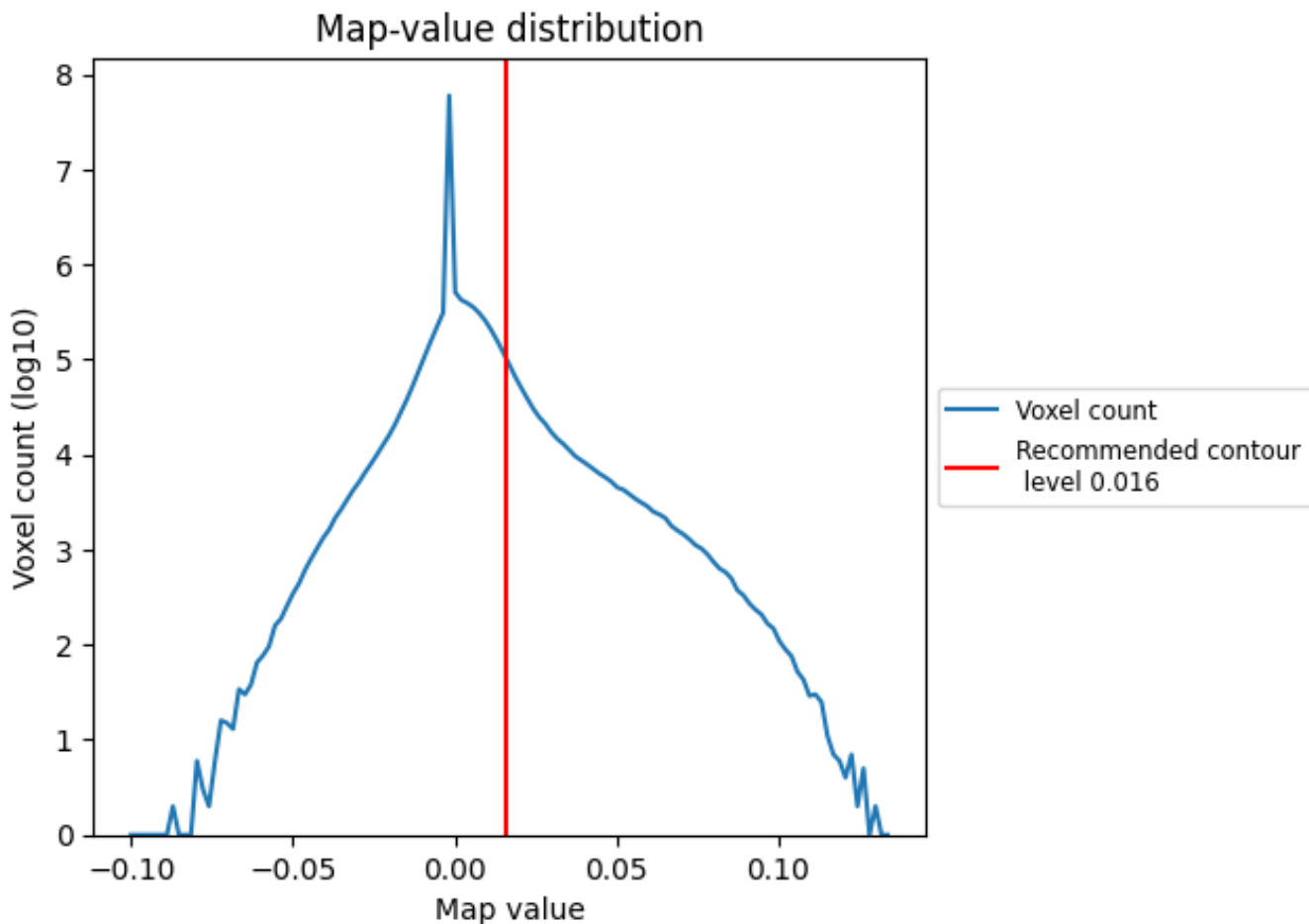
Z



## 7 Map analysis [i](#)

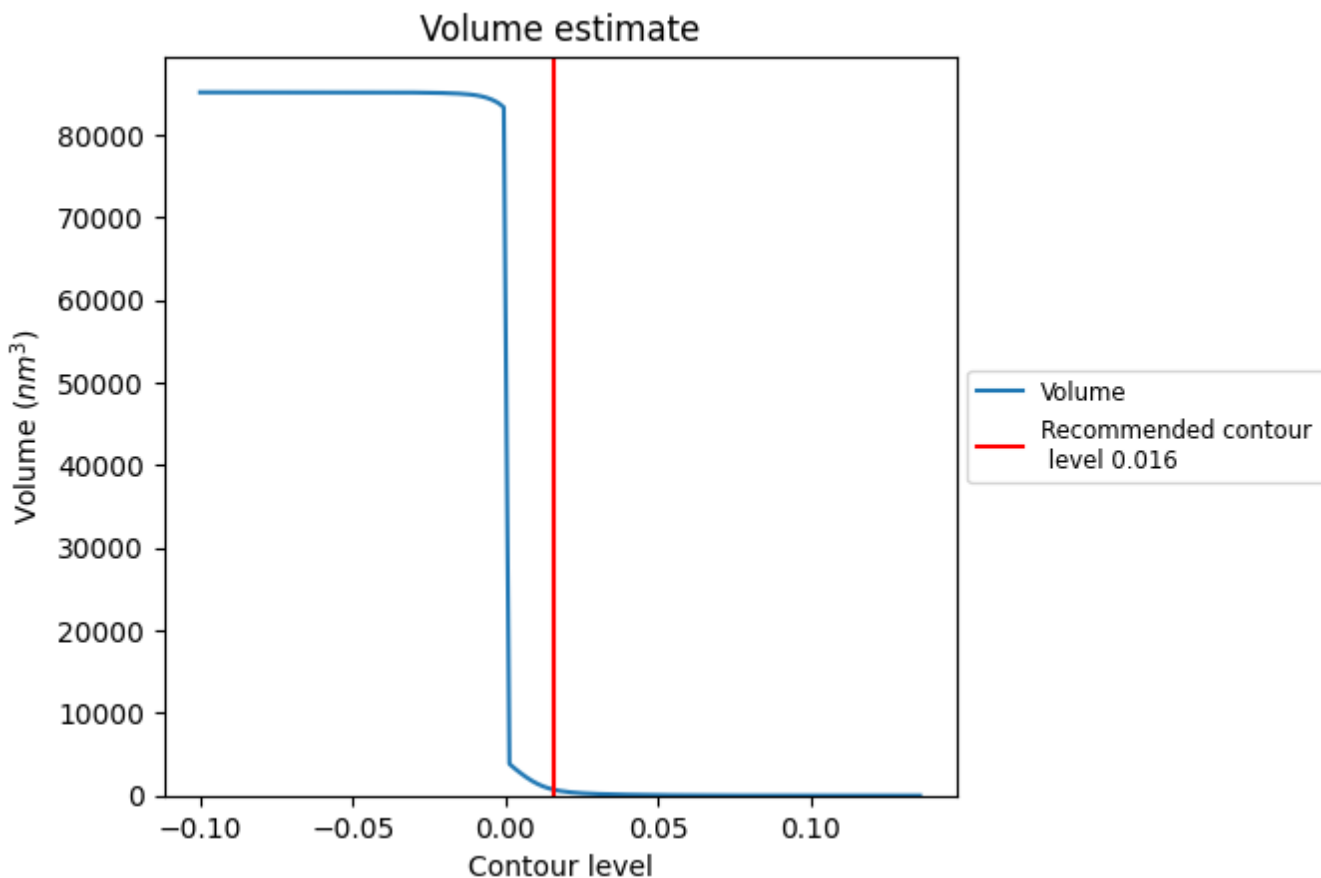
This section contains the results of statistical analysis of the map.

### 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.

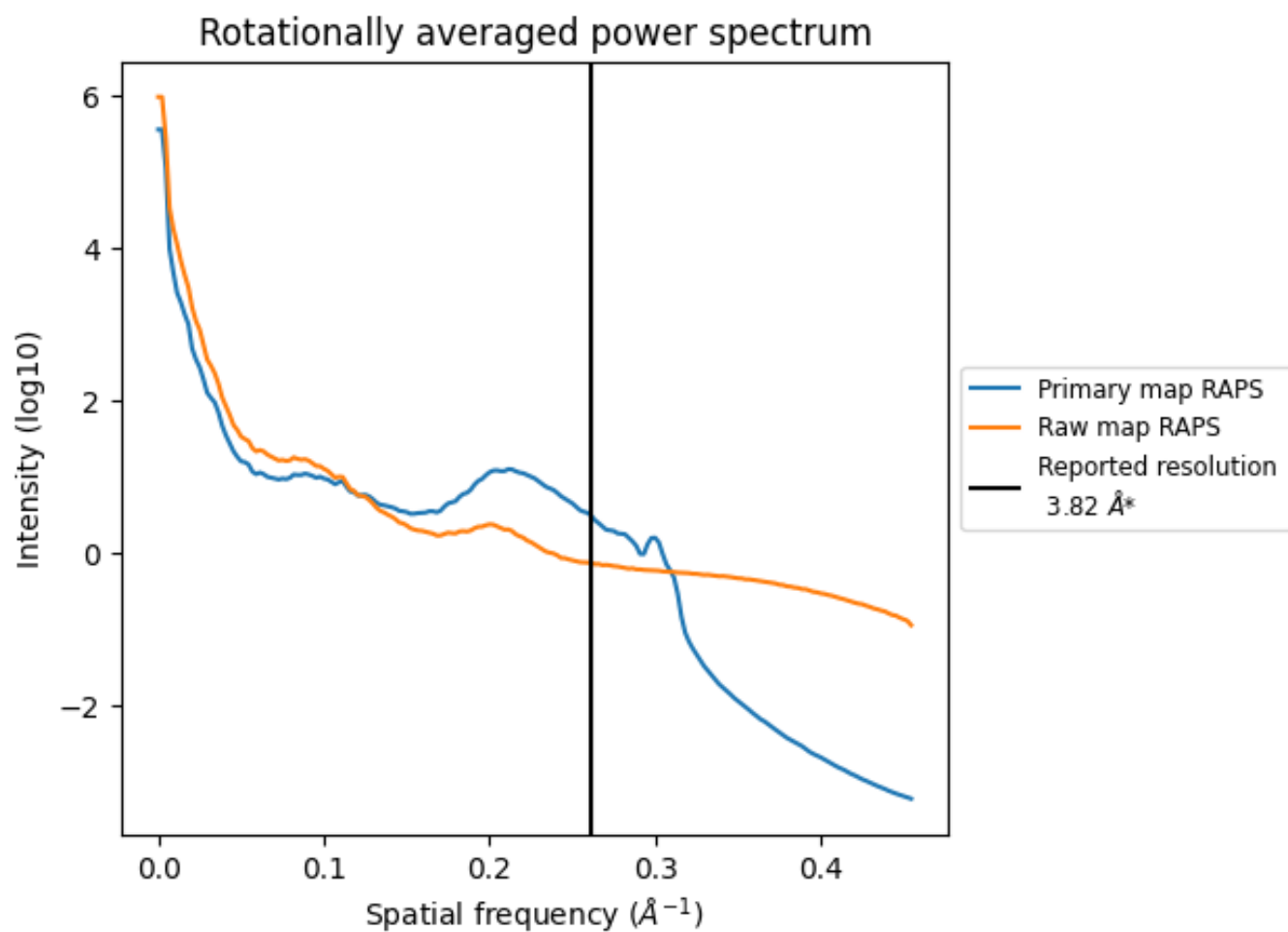
## 7.2 Volume estimate [i](#)



The volume at the recommended contour level is 695  $\text{nm}^3$ ; this corresponds to an approximate mass of 628 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

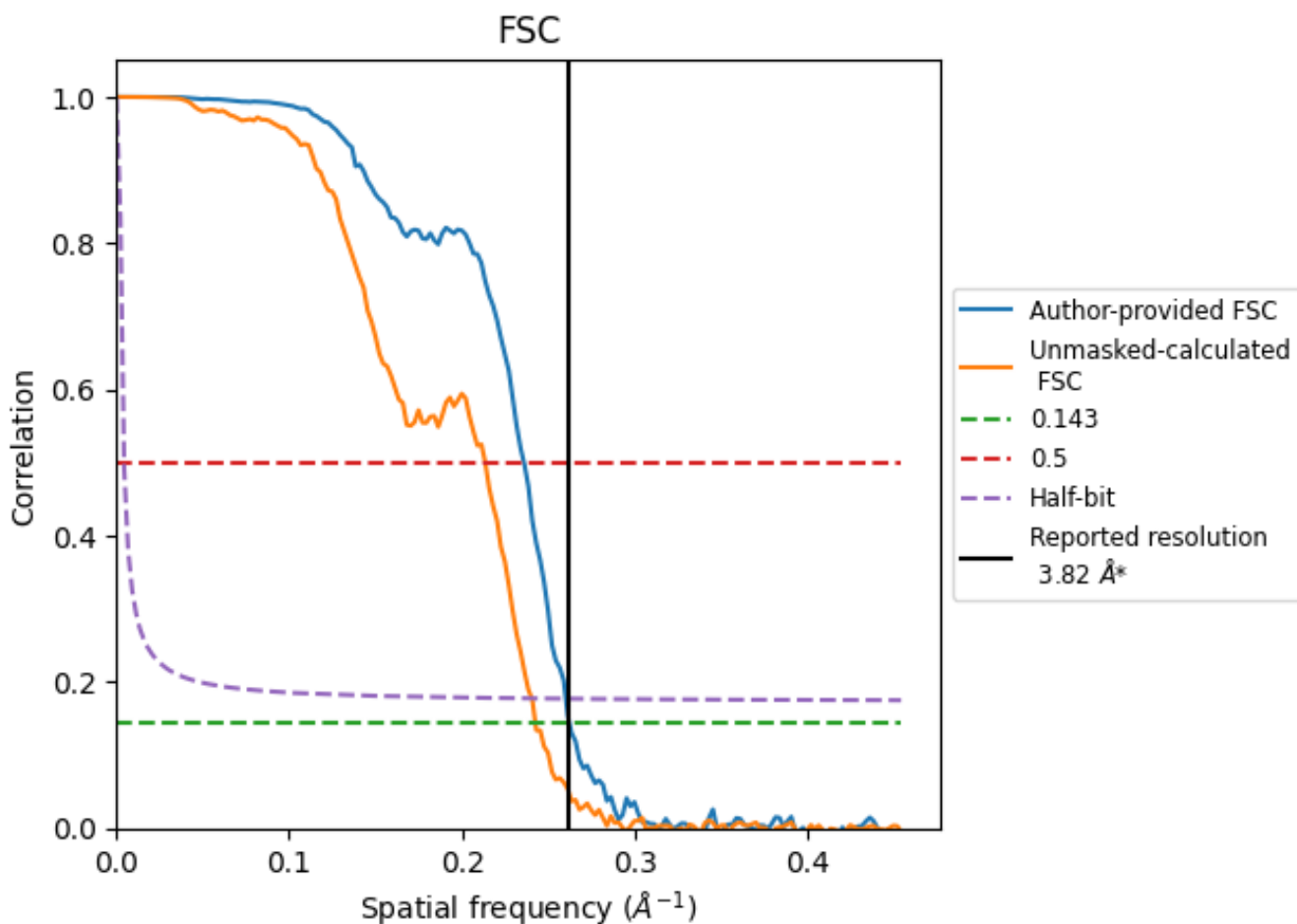


\*Reported resolution corresponds to spatial frequency of 0.262 Å<sup>-1</sup>

## 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 0.262  $\text{\AA}^{-1}$

## 8.2 Resolution estimates [i](#)

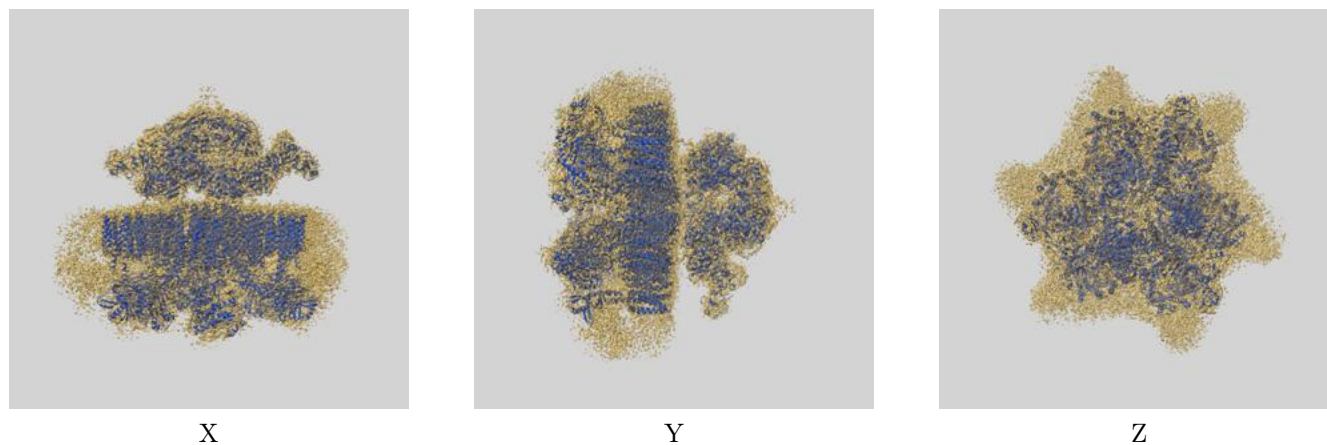
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.82	-	-
Author-provided FSC curve	3.81	4.24	3.84
Unmasked-calculated*	4.12	4.68	4.16

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

## 9 Map-model fit [i](#)

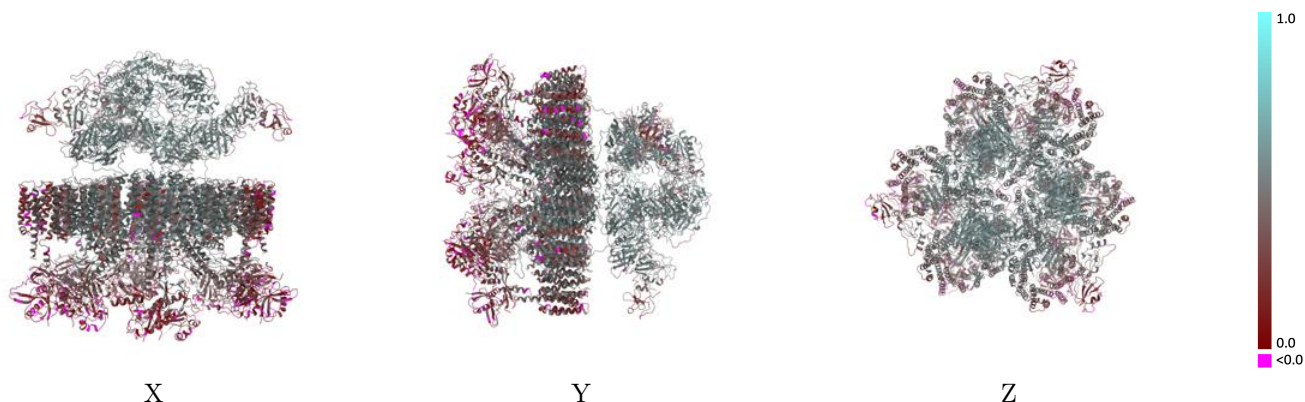
This section contains information regarding the fit between EMDB map EMD-12517 and PDB model 7NPR. Per-residue inclusion information can be found in section 3 on page 6.

### 9.1 Map-model overlay [i](#)



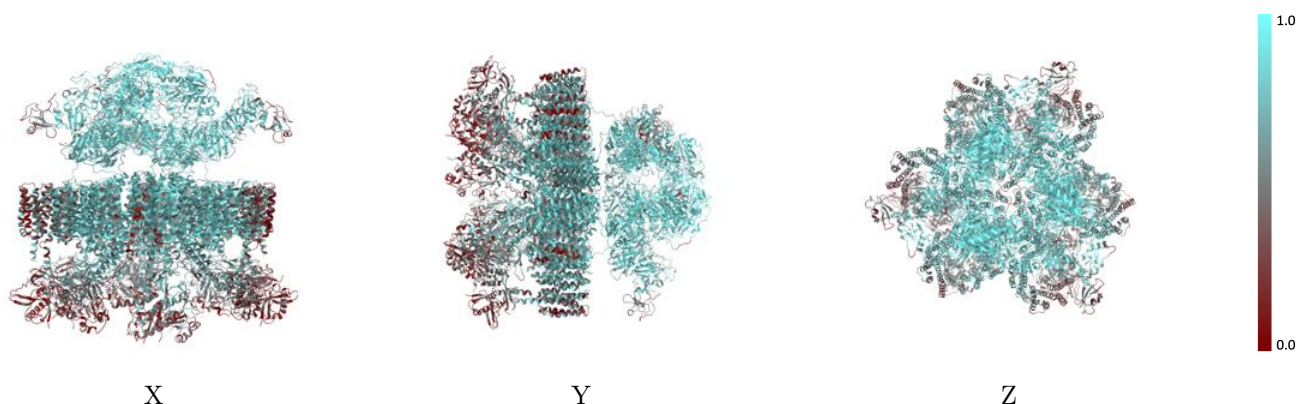
The images above show the 3D surface view of the map at the recommended contour level 0.016 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

## 9.2 Q-score mapped to coordinate model [i](#)



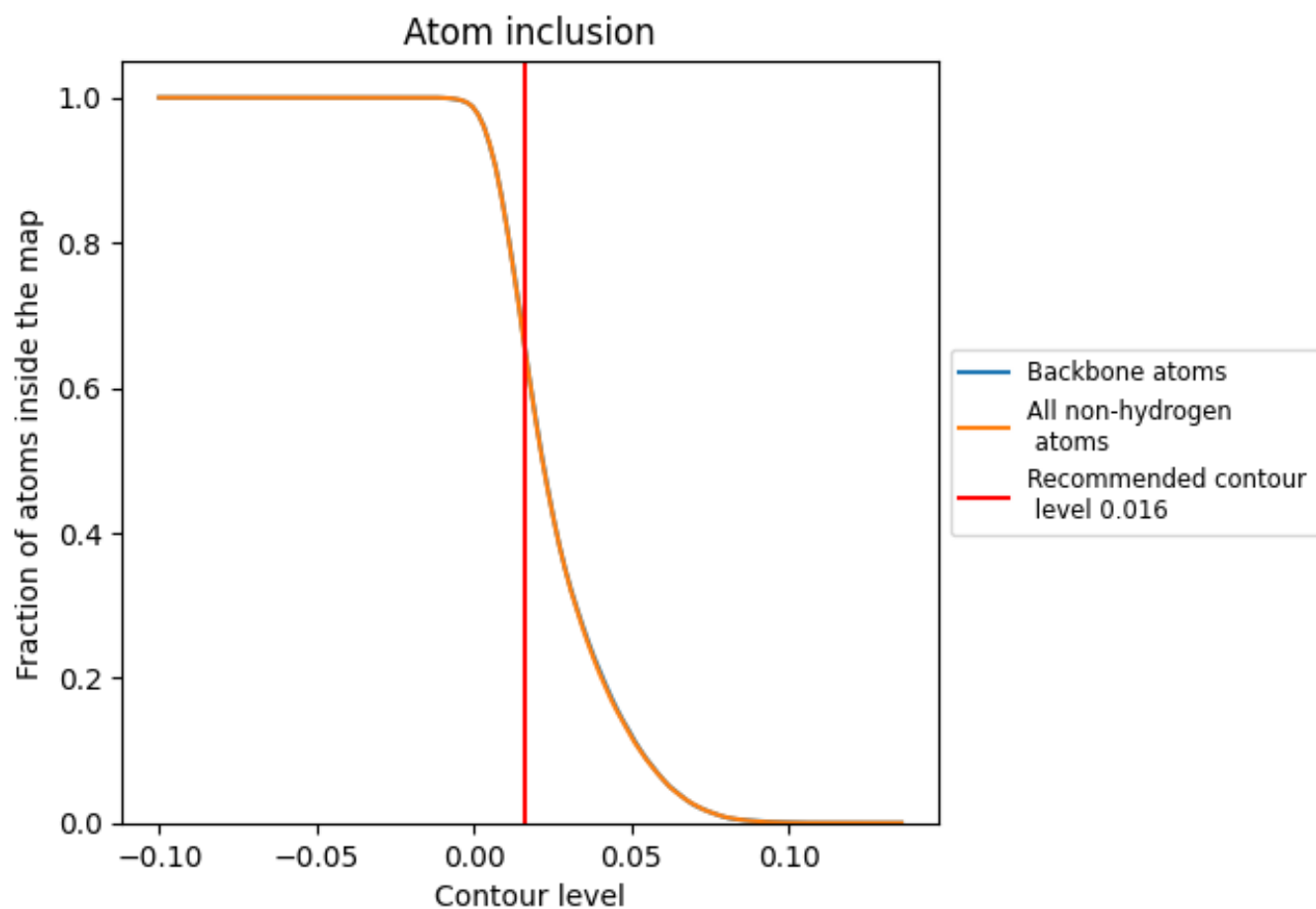
The images above show the model with each residue coloured according to its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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](#)



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 (0.016).

## 9.4 Atom inclusion [i](#)



























































At the recommended contour level, 66% of all backbone atoms, 66% 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 (0.016) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	 0.6560	 0.4070
B1	 0.7659	 0.4640
B2	 0.7662	 0.4640
B3	 0.7662	 0.4620
B4	 0.8256	 0.5060
B5	 0.8216	 0.5050
B6	 0.8210	 0.5040
C1	 0.5850	 0.3430
C2	 0.4837	 0.3080
C3	 0.5815	 0.3450
C4	 0.4767	 0.3050
C5	 0.5806	 0.3450
C6	 0.4815	 0.3040
D1	 0.6109	 0.3770
D2	 0.5122	 0.3190
D3	 0.6927	 0.4280
D4	 0.6032	 0.3780
D5	 0.6123	 0.3760
D6	 0.5139	 0.3230
D7	 0.6953	 0.4280
D8	 0.6071	 0.3800
D9	 0.6120	 0.3740
DA	 0.5142	 0.3170
DB	 0.6907	 0.4270
DC	 0.6051	 0.3790
P1	 0.8528	 0.5170
P2	 0.8531	 0.5150
P3	 0.8516	 0.5130

