wwPDB EM Validation Summary Report ⓘ

Nov 16, 2025 – 01:19 AM JST

PDB ID	:	9JG8 / pdb_00009jg8
EMDB ID	:	EMD-61458
Title	:	Structure of cargo complex (BtpeA-BtaeB-BtapC) bound to the VgrG spike from the Type VI secretion system
Authors	:	Zheng, S.N.; Li, W.X.; Chen, Z.; Gao, X.
Deposited on	:	2024-09-06
Resolution	:	3.06 Å(reported)

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

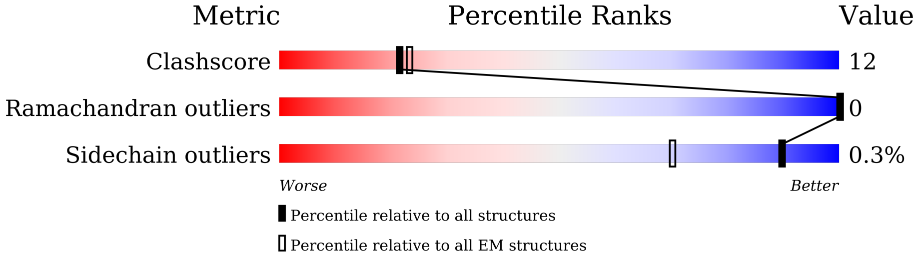
EMDB validation analysis	:	FAILED
MolProbity	:	4-5-2 with Phenix2.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics	:	NOT EXECUTED
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

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 3.06 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%

Mol	Chain	Length	Quality of chain
1	B	608	17% 8% 75%
2	C	617	30% 11% 59%
3	A	254	67% 22% 11%
4	E	618	6% • 92%
4	F	618	7% • 92%
4	G	618	6% • 92%

2 Entry composition ⓘ

There are 5 unique types of molecules in this entry. The entry contains 6002 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 DUF3289 family protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	B	151	1118	704	187	210	17	0	0

- Molecule 2 is a protein called Peptidase C39-like domain-containing protein.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	C	253	1982	1264	330	377	11	0	0

- Molecule 3 is a protein called Bacteroides T6SS Adapter Protein C.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
3	A	226	1863	1196	296	361	10	0	0

- Molecule 4 is a protein called Type VI secretion system spike protein VgrG.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
4	G	49	352	216	58	75	3	0	0
			Total	C	N	O	S		
4	E	48	343	211	56	73	3	0	0
			Total	C	N	O	S		
4	F	48	343	211	56	73	3	0	0

- Molecule 5 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

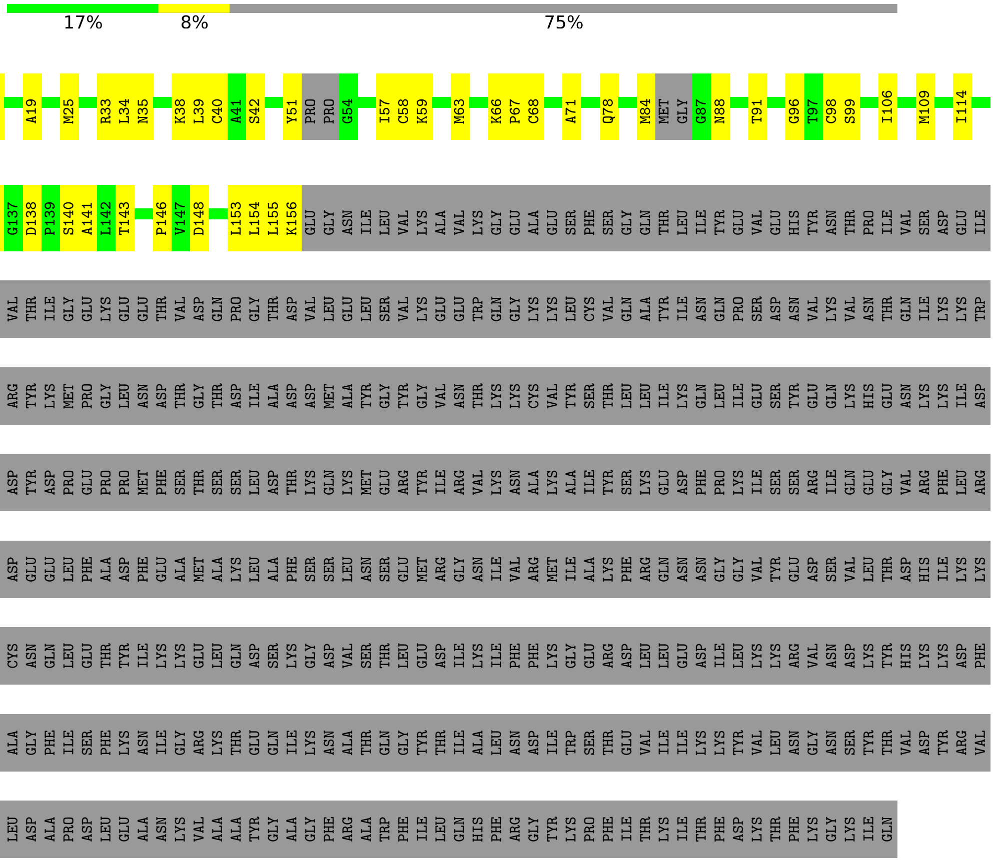
Mol	Chain	Residues	Atoms		AltConf
			Total	Zn	
5	B	1	1	1	0

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. 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. 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.

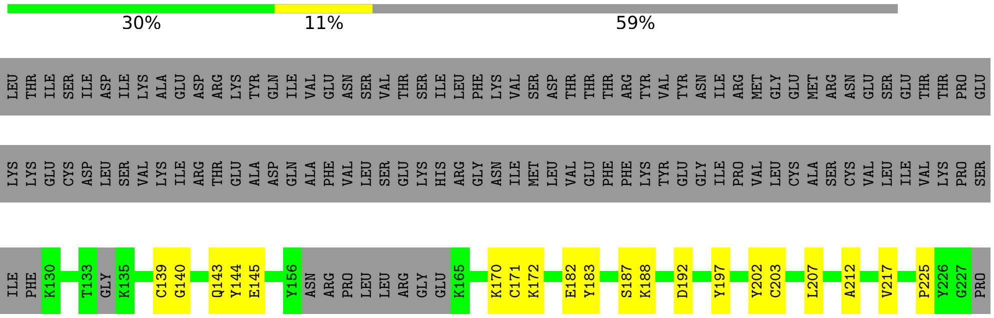
- Molecule 1: DUF3289 family protein

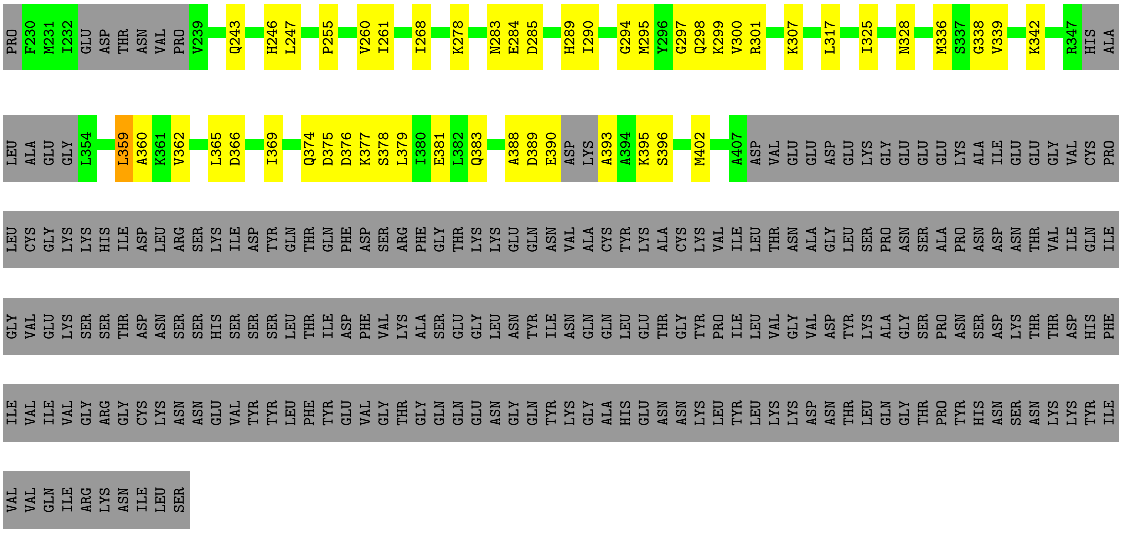
Chain B:



- Molecule 2: Peptidase C39-like domain-containing protein

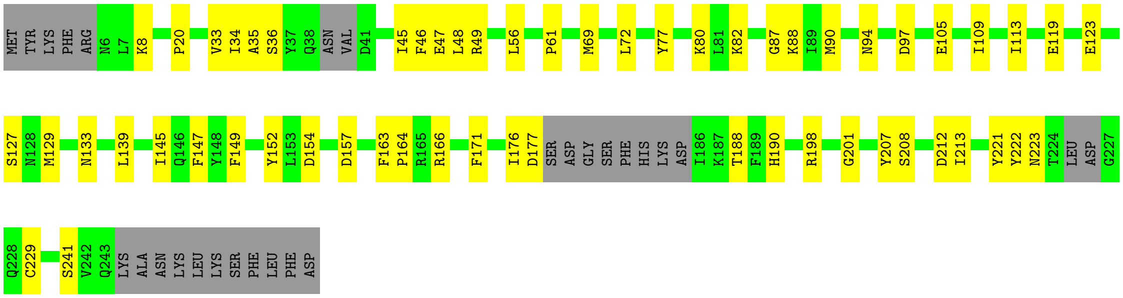
Chain C:





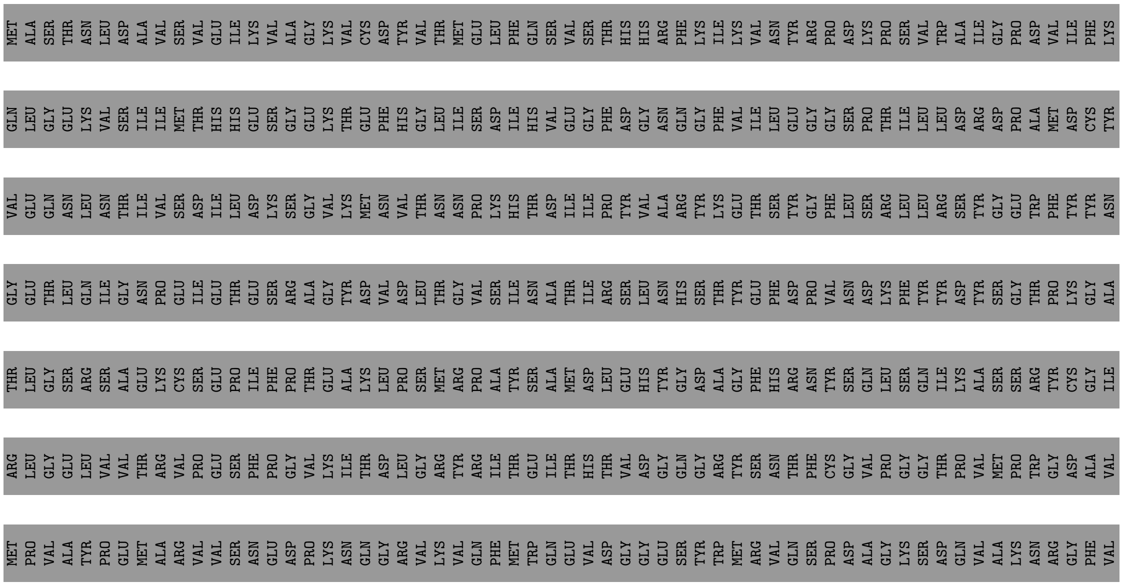
- Molecule 3: Bacteroides T6SS Adapter Protein C

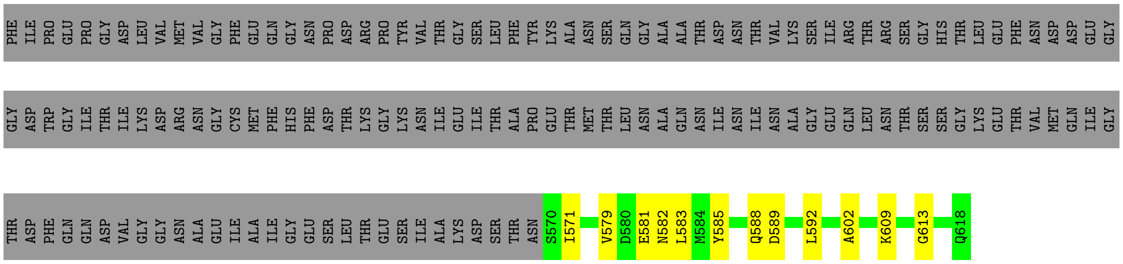
Chain A:



- Molecule 4: Type VI secretion system spike protein VgrG

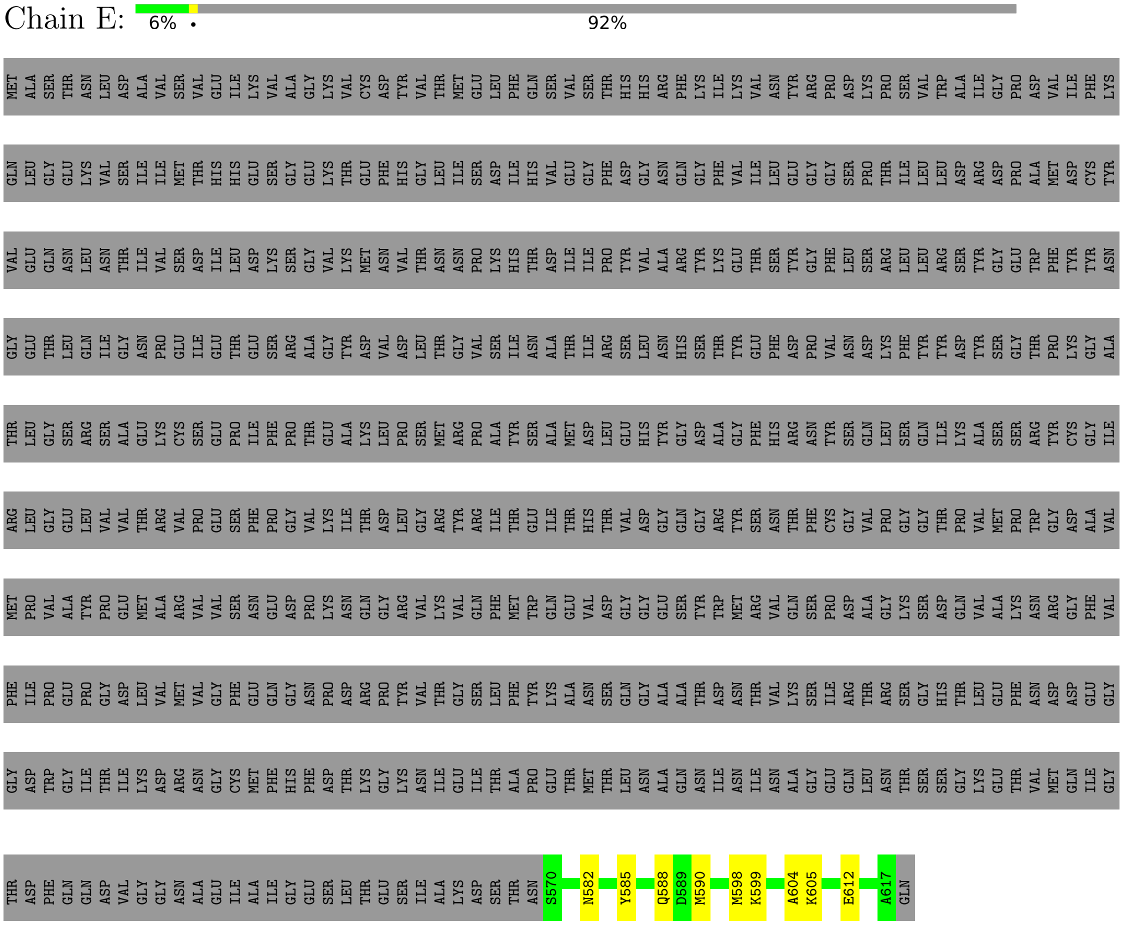
Chain G:





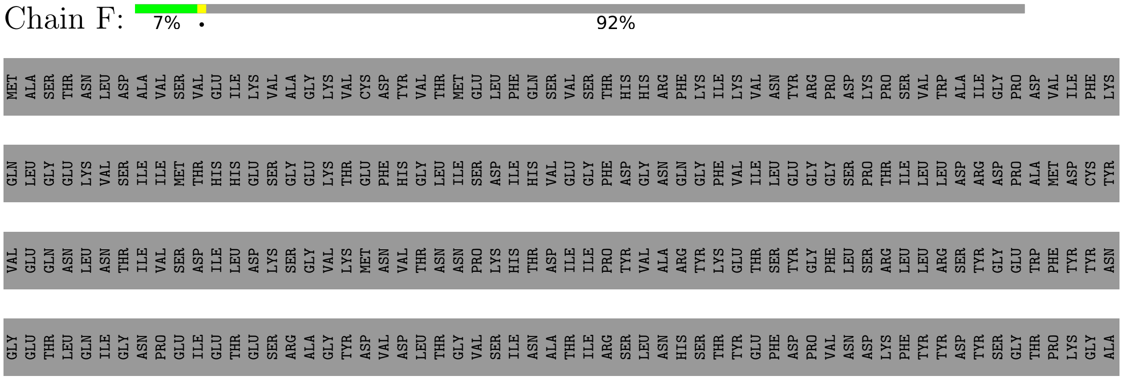
- Molecule 4: Type VI secretion system spike protein VgrG

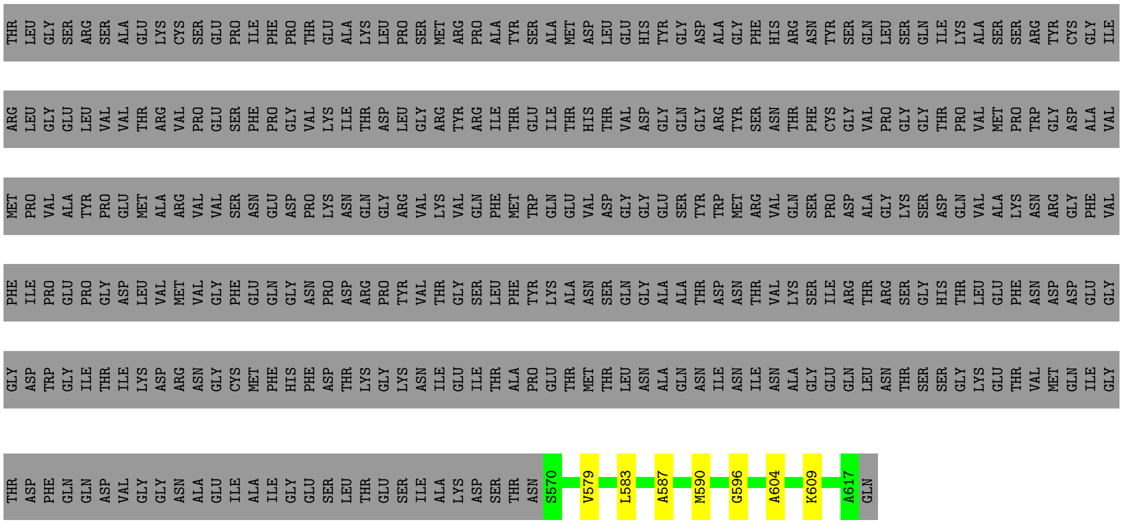
Chain E:



- Molecule 4: Type VI secretion system spike protein VgrG

Chain F:




THR LEU GLY SER ARG SER ALA GLU LYS CYS SER GLU PRO ILE PHE PRO THR GLU ALA LYS LEU PRO SER MET ARG PRO ALA TYR SER ALA MET ASP LEU GLU HIS TYR GLY ASP ALA GLY PHE HIS ARG ASN TYR SER GLN LEU SER GLN ILE LYS ALA SER SER ARG TYR CYS GLY ILE
ARG LEU GLY GLU LEU VAL VAL THR ARG VAL PRO GLU SER PHE PRO GLY VAL LYS ILE THR ASP LEU GLY ARG TYR ARG ILE THR GLU ILE THR HIS THR VAL ASP GLY GLN GLY ARG TYR SER ASN THR PHE CYS GLY VAL PRO GLY GLY THR PRO VAL MET PRO TRP GLY ASP ALA VAL
MET PRO VAL ALA TYR PRO GLU MET ALA ARG VAL VAL SER ASN GLU ASP PRO LYS ASN GLN GLY ARG VAL LYS VAL GLN PHE MET TRP GLN GLU VAL ASP GLY GLY GLU SER TYR TRP MET ARG VAL GLN SER PRO ASP ALA GLY LYS SER ASP GLN VAL ALA LYS ASN ARG GLY PHE VAL
PHE ILE PRO GLU PRO GLY ASP LEU VAL MET VAL GLY PHE GLU GLN GLY ASN PRO ASP ARG PRO TYR VAL THR GLY SER LEU PHE TYR LYS ALA ASN SER GLN GLY ALA ALA THR ASP ASN THR VAL LYS SER ILE ARG THR ARG SER GLY HIS THR LEU GLU PHE ASN ASP ASP GLU GLY
GLY ASP TRP GLY ILE THR ILE LYS ASP ARG ASN GLY CYS MET PHE HIS PHE ASP THR LYS GLY LYS ASN ILE GLU ILE THR ALA PRO GLU THR MET THR LEU ASN ALA GLN ASN ILE ASN ILE ASN ALA GLY GLU GLN LEU ASN THR SER SER GLY LYS GLU THR VAL MET GLN ILE GLY
THR ASP PHE GLN GLN ASP VAL GLY GLY ASN ALA GLU ILE ALA ILE GLY GLU SER LEU THR GLU SER ILE ALA LYS ASP SER THR ASN
S570
V579
L583
A587
M590
G596
A604
K609
A617
GLN

4 Experimental information

Property	**Value**	**Source**
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	106021	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 ($e^-/\text{Å}^2$)	60	Depositor
Minimum defocus (nm)	1000	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor

5 Model quality ⓘ

5.1 Standard geometry ⓘ

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

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

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\#\|Z\| > 5$	RMSZ	$\#\|Z\| > 5$
1	B	0.18	0/1140	0.34	0/1536
2	C	0.29	0/2012	0.42	0/2695
3	A	0.24	0/1899	0.37	0/2556
4	E	0.11	0/343	0.27	0/461
4	F	0.09	0/343	0.26	0/461
4	G	0.10	0/352	0.27	0/473
All	All	0.23	0/6089	0.37	0/8182

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 ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	1118	0	1116	33	0
2	C	1982	0	1989	59	0
3	A	1863	0	1820	37	0
4	E	343	0	348	9	0
4	F	343	0	348	8	0
4	G	352	0	356	12	0
5	B	1	0	0	0	0
All	All	6002	0	5977	138	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 138 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:B:42:SER:HB3	1:B:84:MET:HE2	1.66	0.76
2:C:336:MET:HE2	2:C:339:VAL:HG21	1.70	0.72
3:A:154:ASP:HB3	3:A:176:ILE:HG22	1.77	0.66
3:A:20:PRO:HD3	3:A:229:CYS:SG	2.34	0.66
3:A:119:GLU:O	3:A:123:GLU:HG2	1.96	0.66

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	145/608 (24%)	138 (95%)	7 (5%)	0	100	100
2	C	239/617 (39%)	229 (96%)	10 (4%)	0	100	100
3	A	218/254 (86%)	204 (94%)	14 (6%)	0	100	100
4	E	46/618 (7%)	44 (96%)	2 (4%)	0	100	100
4	F	46/618 (7%)	42 (91%)	4 (9%)	0	100	100
4	G	47/618 (8%)	46 (98%)	1 (2%)	0	100	100
All	All	741/3333 (22%)	703 (95%)	38 (5%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	125/533 (24%)	125 (100%)	0	100	100
2	C	215/541 (40%)	214 (100%)	1 (0%)	86	91
3	A	210/236 (89%)	209 (100%)	1 (0%)	86	91
4	E	37/524 (7%)	37 (100%)	0	100	100
4	F	37/524 (7%)	37 (100%)	0	100	100
4	G	38/524 (7%)	38 (100%)	0	100	100
All	All	662/2882 (23%)	660 (100%)	2 (0%)	90	94

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	C	359	LEU
3	A	222	TYR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 7 such sidechains are listed below:

Mol	Chain	Res	Type
2	C	374	GLN
3	A	120	GLN
4	F	595	GLN
4	E	582	ASN
2	C	283	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 1 ligands modelled in this entry, 1 is monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.