



Full wwPDB X-ray Structure Validation Report ⓘ

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PDB ID : 2HXW / pdb_00002hxx
Title : Crystal Structure of Peb3 from Campylobacter jejuni
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Deposited on : 2006-08-04
Resolution : 1.60 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

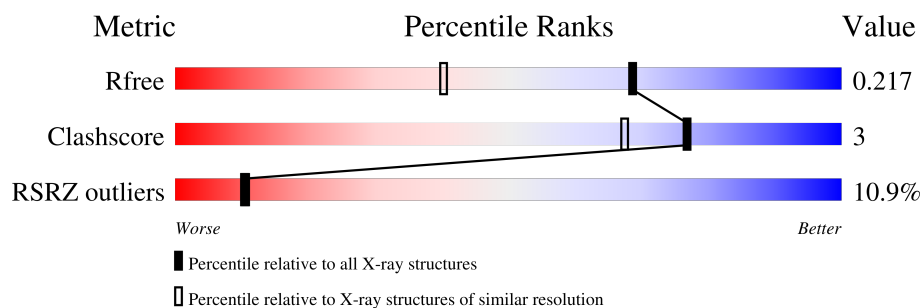
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.60 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)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	4673 (1.60-1.60)
Clashscore	190562	4931 (1.60-1.60)
RSRZ outliers	180081	4672 (1.60-1.60)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower 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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	237	<div> <div>4%</div> <div>90%</div> <div>7%</div> <div>.</div> </div>
1	B	237	<div> <div>17%</div> <div>89%</div> <div>8%</div> <div>.</div> </div>

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 4003 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, 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 Major antigenic peptide PEB3.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	229	Total	C	N	O	Se	5	6	0
			1821	1170	306	344	1			
1	B	230	Total	C	N	O	Se	0	1	0
			1807	1160	310	336	1			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	20	MSE	-	initiating methionine	UNP Q9PIK7
A	147	MSE	MET	modified residue	UNP Q9PIK7
A	251	HIS	-	expression tag	UNP Q9PIK7
A	252	HIS	-	expression tag	UNP Q9PIK7
A	253	HIS	-	expression tag	UNP Q9PIK7
A	254	HIS	-	expression tag	UNP Q9PIK7
A	255	HIS	-	expression tag	UNP Q9PIK7
A	256	HIS	-	expression tag	UNP Q9PIK7
B	20	MSE	-	initiating methionine	UNP Q9PIK7
B	147	MSE	MET	modified residue	UNP Q9PIK7
B	251	HIS	-	expression tag	UNP Q9PIK7
B	252	HIS	-	expression tag	UNP Q9PIK7
B	253	HIS	-	expression tag	UNP Q9PIK7
B	254	HIS	-	expression tag	UNP Q9PIK7
B	255	HIS	-	expression tag	UNP Q9PIK7
B	256	HIS	-	expression tag	UNP Q9PIK7

- Molecule 2 is CITRATE ANION (CCD ID: FLC) (formula: $C_6H_5O_7$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			13	6	7		
2	B	1	Total	C	O	0	0
			13	6	7		

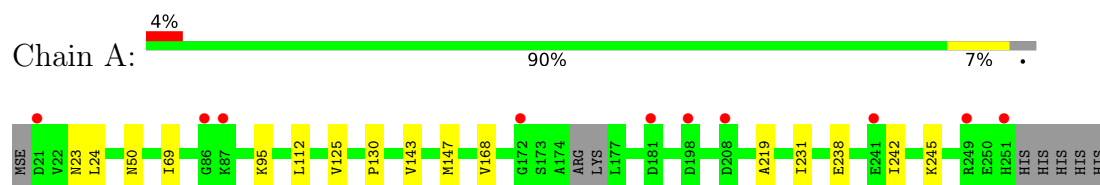
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	198	Total	O	0	0
			198	198		
3	B	151	Total	O	0	0
			151	151		

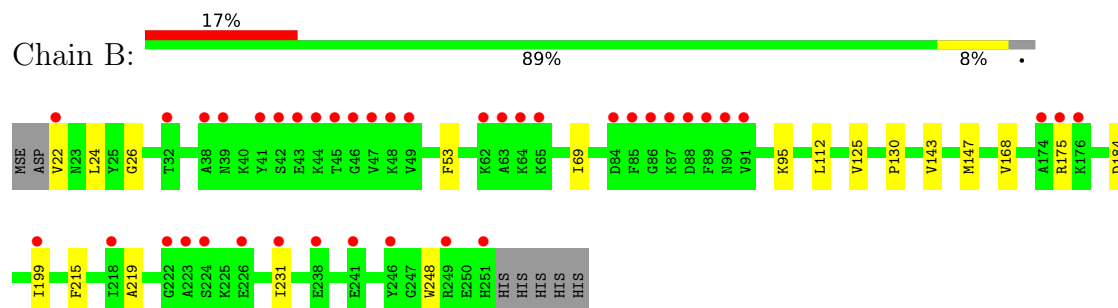
3 Residue-property plots [i](#)

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 electron 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 dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). 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: Major antigenic peptide PEB3



- Molecule 1: Major antigenic peptide PEB3



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	46.47Å 101.67Å 59.10Å 90.00° 108.98° 90.00°	Depositor
Resolution (Å)	50.00 – 1.60 50.00 – 1.60	Depositor EDS
% Data completeness (in resolution range)	99.6 (50.00-1.60) 99.6 (50.00-1.60)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.06	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.38 (at 1.58Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.187 , 0.212 (Not available) , 0.217	Depositor DCC
R_{free} test set	3373 reflections (4.79%)	wwPDB-VP
Wilson B-factor (Å ²)	18.0	Xtriage
Anisotropy	0.472	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 35.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	4003	wwPDB-VP
Average B, all atoms (Å ²)	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.78% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

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

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	0.53	0/1876	0.70	0/2531
1	B	0.51	0/1848	0.73	0/2494
All	All	0.52	0/3724	0.72	0/5025

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	A	1821	0	1835	10	0
1	B	1807	0	1824	11	0
2	A	13	0	5	0	0
2	B	13	0	5	0	0
3	A	198	0	0	1	0
3	B	151	0	0	2	0
All	All	4003	0	3669	21	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 3.

All (21) 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:219:ALA:HB2	1:A:231:ILE:CD1	2.33	0.58
1:B:22:VAL:N	3:B:431:HOH:O	2.39	0.54
1:A:219:ALA:HB2	1:A:231:ILE:HD11	1.90	0.54
1:B:95:LYS:NZ	3:B:370:HOH:O	2.42	0.52
1:A:130:PRO:HA	1:A:168:VAL:O	2.13	0.48
1:B:175:ARG:O	1:B:199:ILE:HD13	2.13	0.48
1:B:125[B]:VAL:CG1	1:B:184:ASP:HB2	2.45	0.47
1:B:112:LEU:HD13	1:B:125[A]:VAL:HG12	1.97	0.46
1:A:24:LEU:HG	1:A:69:ILE:HB	1.98	0.45
1:B:24:LEU:HG	1:B:69:ILE:HB	1.99	0.45
1:A:143:VAL:HG12	1:A:147:MSE:HE2	1.99	0.45
1:B:219:ALA:HB2	1:B:231:ILE:CD1	2.46	0.44
1:B:130:PRO:HA	1:B:168:VAL:O	2.17	0.44
1:A:238[A]:GLU:H	1:A:238[A]:GLU:CD	2.27	0.43
1:B:26:GLY:O	1:B:53:PHE:HA	2.20	0.42
1:A:23:ASN:HD22	1:A:50:ASN:HB2	1.86	0.41
1:A:95:LYS:NZ	3:A:442:HOH:O	2.54	0.41
1:A:242:ILE:HA	1:A:245:LYS:HE3	2.02	0.41
1:B:215:PHE:HB2	1:B:248:TRP:CZ3	2.56	0.41
1:B:143:VAL:HG12	1:B:147:MSE:HE2	2.04	0.40
1:A:112:LEU:HD13	1:A:125[A]:VAL:HG12	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

There are no protein backbone outliers to report in this entry.

5.3.2 Protein sidechains [i](#)

There are no protein residues with a non-rotameric sidechain to report in this entry.

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](#)

2 ligands are modelled in this entry.

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	FLC	B	301	-	12,12,12	1.07	0	17,17,17	1.18	2 (11%)
2	FLC	A	301	-	12,12,12	1.07	0	17,17,17	1.19	2 (11%)

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	FLC	B	301	-	-	3/16/16/16	-
2	FLC	A	301	-	-	2/16/16/16	-

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	301	FLC	OB2-CBC-CB	3.00	118.90	113.14
2	B	301	FLC	OB2-CBC-CB	2.70	118.33	113.14
2	B	301	FLC	OA2-CAC-CA	2.34	121.75	114.35
2	A	301	FLC	OA2-CAC-CA	2.02	120.73	114.35

There are no chirality outliers.

All (5) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	FLC	CAC-CA-CB-OHB
2	B	301	FLC	CAC-CA-CB-OHB
2	A	301	FLC	CB-CA-CAC-OA1
2	B	301	FLC	CB-CA-CAC-OA1
2	B	301	FLC	CB-CA-CAC-OA2

There are no ring outliers.

No monomer is involved in short contacts.

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 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	228/237 (96%)	0.40	10 (4%) 39 40	10, 24, 32, 36	6 (2%)
1	B	229/237 (96%)	0.86	40 (17%) 4 3	15, 25, 45, 54	1 (0%)
All	All	457/474 (96%)	0.63	50 (10%) 10 10	10, 24, 41, 54	7 (1%)

All (50) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	42	SER	5.0
1	B	91	VAL	4.6
1	B	251	HIS	4.2
1	B	43	GLU	4.2
1	A	87	LYS	3.8
1	A	21	ASP	3.8
1	B	45	THR	3.8
1	A	251	HIS	3.7
1	B	226	GLU	3.6
1	B	22	VAL	3.5
1	B	41	TYR	3.5
1	B	175	ARG	3.5
1	B	87	LYS	3.4
1	B	89	PHE	3.4
1	B	38	ALA	3.2
1	B	49	VAL	3.1
1	B	48	LYS	3.0
1	B	88	ASP	3.0
1	B	46	GLY	3.0
1	A	181	ASP	2.9
1	B	47	VAL	2.9
1	B	223	ALA	2.8
1	B	249	ARG	2.6
1	B	44	LYS	2.6

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Mol	Chain	Res	Type	RSRZ
1	B	63	ALA	2.6
1	A	241	GLU	2.5
1	B	222	GLY	2.5
1	B	174	ALA	2.5
1	B	85	PHE	2.4
1	B	32	THR	2.4
1	B	39	ASN	2.3
1	B	90	ASN	2.3
1	B	231	ILE	2.3
1	A	249	ARG	2.3
1	A	198	ASP	2.3
1	B	176	LYS	2.2
1	B	86	GLY	2.2
1	A	86	GLY	2.2
1	B	84	ASP	2.2
1	B	64	LYS	2.2
1	B	218	ILE	2.2
1	B	238	GLU	2.1
1	B	241	GLU	2.1
1	B	246	TYR	2.1
1	B	224	SER	2.1
1	B	62	LYS	2.1
1	A	208	ASP	2.1
1	B	65	LYS	2.1
1	A	172	GLY	2.0
1	B	199	ILE	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	FLC	A	301	13/13	0.96	0.07	21,23,25,26	0
2	FLC	B	301	13/13	0.96	0.07	21,24,26,26	0

6.5 Other polymers [i](#)

There are no such residues in this entry.