wwPDB X-ray Structure Validation Summary Report (i)

Oct 24, 2023 – 02:10 PM EDT

PDB ID	:	8SVD
Title	:	Structure of M. baixiangningiae DarR-DNA complex reveals novel dimer-of-dimers DNA binding
Authors	:	Schumacher, M.A.
Deposited on	:	2023-05-16
Resolution	:	3.49 Å(reported)

This is a wwPDB X-ray Structure 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/XrayValidationReportHelp
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:

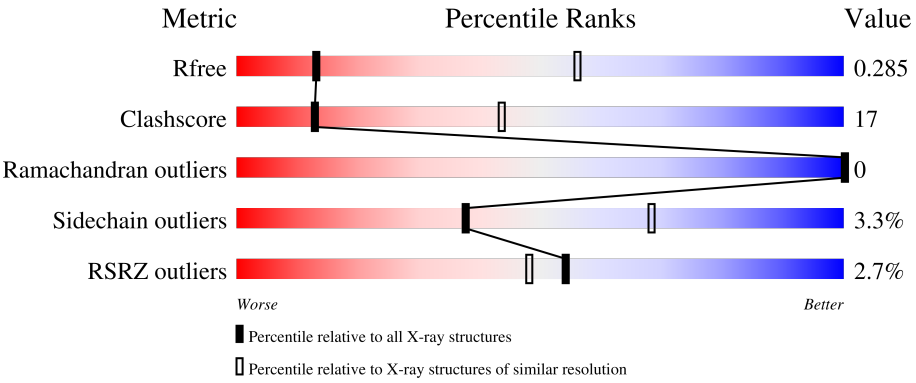
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 3.49 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}	130704	1659 (3.60-3.40)
Clashscore	141614	1036 (3.58-3.42)
Ramachandran outliers	138981	1005 (3.58-3.42)
Sidechain outliers	138945	1006 (3.58-3.42)
RSRZ outliers	127900	1559 (3.60-3.40)

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 <=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	209	2% 61% 30% • 7%
1	E	209	59% 33% • 6%
1	F	209	% 62% 31% • 6%
1	G	209	5% 63% 29% • 7%
1	I	209	9% 60% 32% 8%

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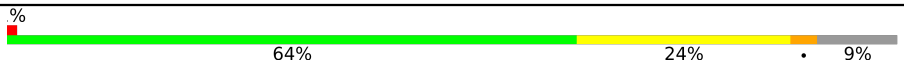
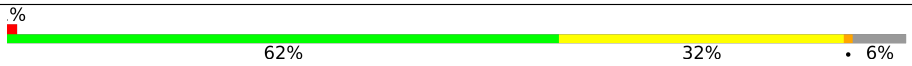
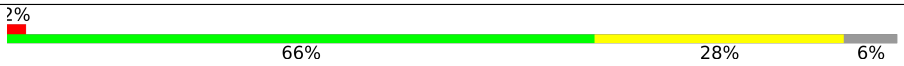
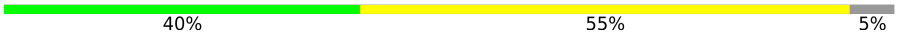
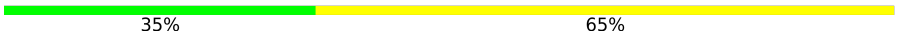
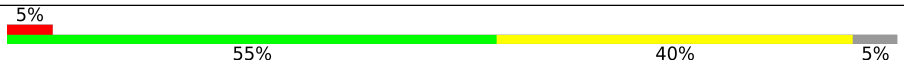
Mol	Chain	Length	Quality of chain
1	J	209	
1	K	209	
1	T	209	
2	B	20	
2	D	20	
2	M	20	
2	Q	20	

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 13404 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 DarR.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	194	Total	C	N	O	S	0	0	0
			1480	923	272	279	6			
1	F	197	Total	C	N	O	S	0	0	0
			1492	933	270	283	6			
1	G	195	Total	C	N	O	S	0	0	0
			1499	935	275	283	6			
1	T	197	Total	C	N	O	S	0	0	0
			1507	939	278	284	6			
1	E	197	Total	C	N	O	S	0	0	0
			1496	936	273	281	6			
1	I	192	Total	C	N	O	S	0	0	0
			1429	899	251	274	5			
1	J	191	Total	C	N	O	S	0	0	0
			1450	904	262	278	6			
1	K	197	Total	C	N	O	S	0	0	0
			1476	925	264	281	6			

- Molecule 2 is a DNA chain called DNA (5'-D(P*TP*AP*GP*AP*TP*AP*CP*TP*CP*CP *GP*GP*AP*GP*TP*AP*TP*CP*TP*A)-3').

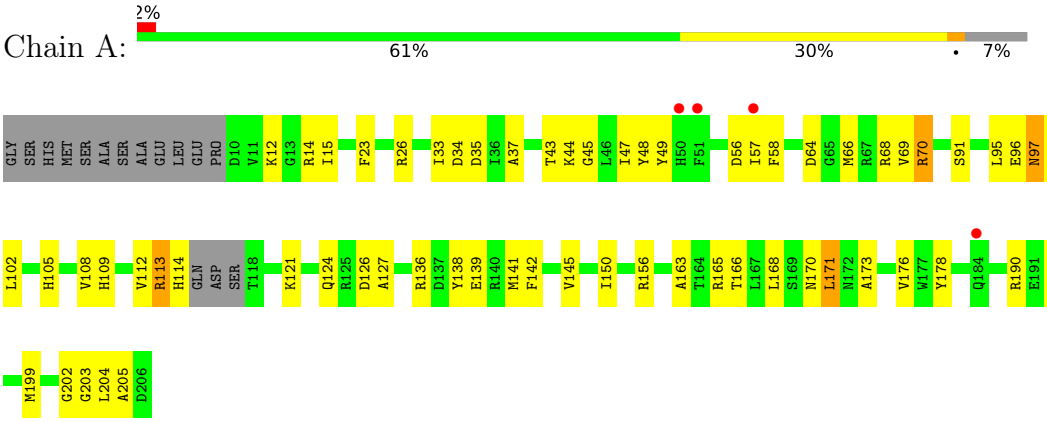
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	D	19	Total	C	N	O	P	0	0	0
			389	186	69	115	19			
2	B	19	Total	C	N	O	P	0	0	0
			387	186	72	111	18			
2	M	20	Total	C	N	O	P	0	0	0
			410	196	74	120	20			
2	Q	19	Total	C	N	O	P	0	0	0
			389	186	69	115	19			

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.

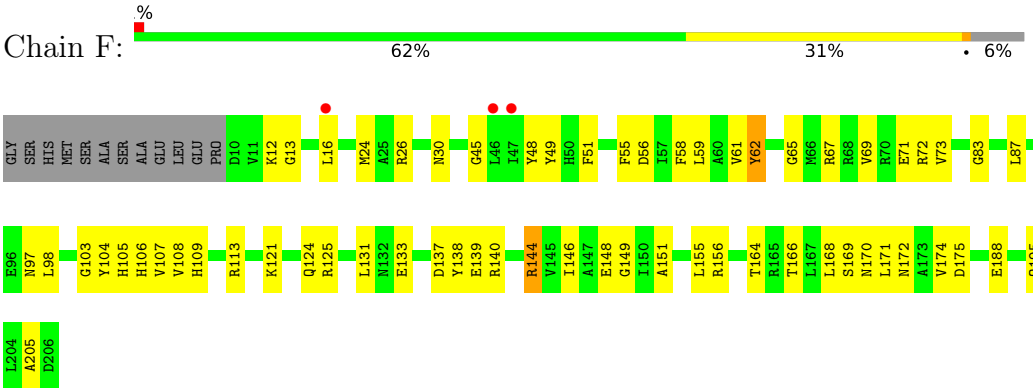
• Molecule 1: DarR

Chain A:



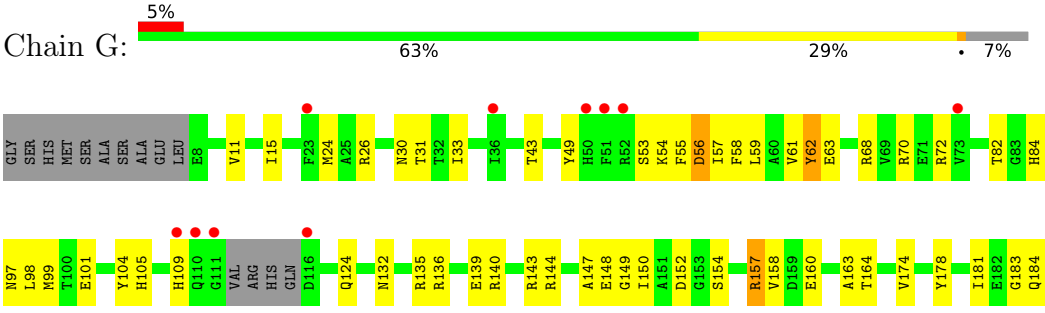
• Molecule 1: DarR

Chain F:



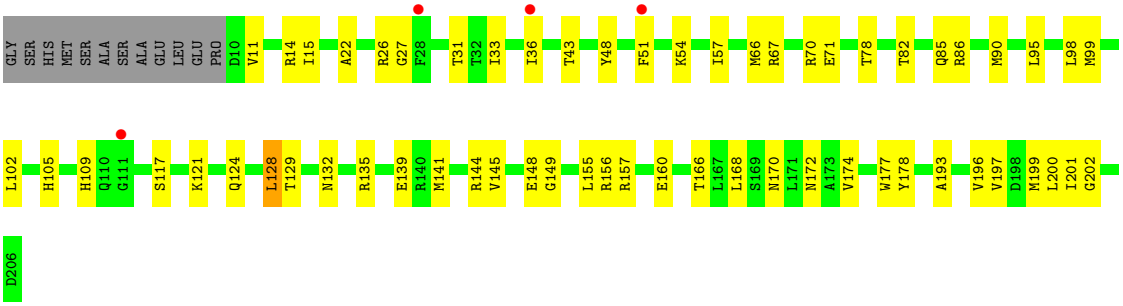
• Molecule 1: DarR

Chain G:



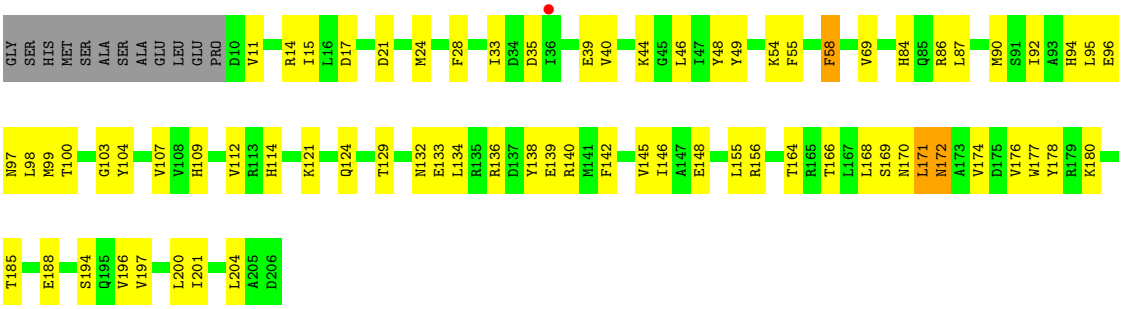
• Molecule 1: DarR

Chain T:



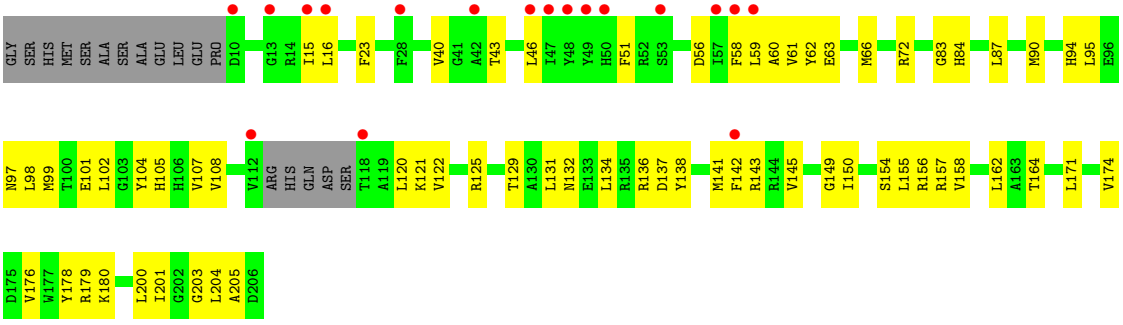
• Molecule 1: DarR

Chain E:



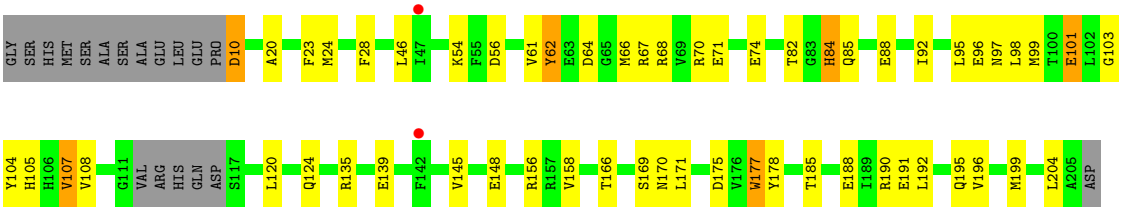
• Molecule 1: DarR

Chain I:



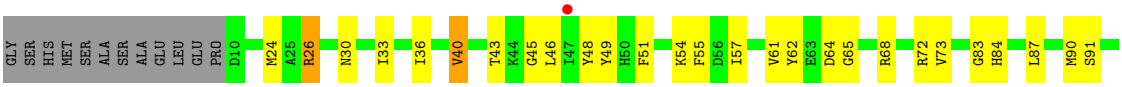
• Molecule 1: DarR

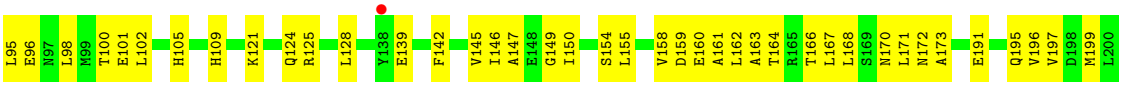
Chain J:



• Molecule 1: DarR

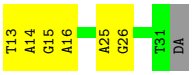
Chain K:





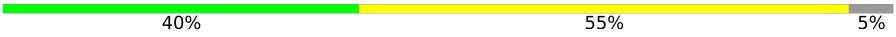
• Molecule 2: DNA (5'-D(P*TP*AP*GP*AP*TP*AP*CP*TP*CP*CP*GP*GP*AP*GP*TP*AP*TP*CP*TP*A)-3')

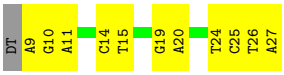
Chain D:



• Molecule 2: DNA (5'-D(P*TP*AP*GP*AP*TP*AP*CP*TP*CP*CP*GP*GP*AP*GP*TP*AP*TP*CP*TP*A)-3')

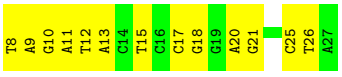
Chain B:





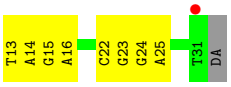
• Molecule 2: DNA (5'-D(P*TP*AP*GP*AP*TP*AP*CP*TP*CP*CP*GP*GP*AP*GP*TP*AP*TP*CP*TP*A)-3')

Chain M:



• Molecule 2: DNA (5'-D(P*TP*AP*GP*AP*TP*AP*CP*TP*CP*CP*GP*GP*AP*GP*TP*AP*TP*CP*TP*A)-3')

Chain Q:


T13
A14
G15
A16
C22
G23
G24
A25
T31
DA

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	68.03Å 155.76Å 117.84Å 90.00° 97.26° 90.00°	Depositor
Resolution (Å)	47.45 – 3.49 47.45 – 3.49	Depositor EDS
% Data completeness (in resolution range)	98.3 (47.45-3.49) 98.3 (47.45-3.49)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.10	Depositor
$< I/\sigma(I) >$ [1]	2.30 (at 3.48Å)	Xtriage
Refinement program	PHENIX (1.20.1_4487: ???)	Depositor
R, R_{free}	0.267 , 0.284 0.268 , 0.285	Depositor DCC
R_{free} test set	1998 reflections (6.55%)	wwPDB-VP
Wilson B-factor (Å^2)	110.8	Xtriage
Anisotropy	0.613	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.27 , 43.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.47$, $< L^2 > = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	13404	wwPDB-VP
Average B, all atoms (Å^2)	125.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 11.89% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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

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	0.28	0/1501	0.61	1/2029 (0.0%)
1	E	0.27	0/1518	0.62	0/2054
1	F	0.26	0/1514	0.56	0/2050
1	G	0.27	0/1521	0.58	0/2055
1	I	0.26	0/1450	0.58	0/1968
1	J	0.32	0/1471	0.63	0/1991
1	K	0.26	0/1498	0.53	0/2030
1	T	0.25	0/1529	0.59	0/2069
2	B	0.65	0/434	0.95	0/668
2	D	0.54	0/435	0.96	0/669
2	M	0.53	0/459	0.95	0/706
2	Q	0.51	0/435	0.92	0/669
All	All	0.32	0/13765	0.65	1/18958 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	171	LEU	CA-CB-CG	5.77	128.57	115.30

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	1480	0	1425	50	0
1	E	1496	0	1449	65	0
1	F	1492	0	1432	56	0
1	G	1499	0	1457	49	0
1	I	1429	0	1356	55	0
1	J	1450	0	1382	53	0
1	K	1476	0	1409	54	0
1	T	1507	0	1457	49	0
2	B	387	0	216	13	0
2	D	389	0	216	6	0
2	M	410	0	227	14	0
2	Q	389	0	216	13	0
All	All	13404	0	12242	414	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 17.

The worst 5 of 414 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:J:199:MET:SD	1:K:158:VAL:HG21	1.81	1.20
1:E:94:HIS:NE2	1:E:172:ASN:OD1	1.92	1.02
1:K:36:ILE:O	1:K:40:VAL:HG12	1.62	0.97
1:J:97:ASN:HD22	1:J:105:HIS:HD2	1.08	0.97
1:I:84:HIS:HB2	1:I:154:SER:HB2	1.50	0.94

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 X-ray entries followed by that with respect to entries of similar resolution.

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	190/209 (91%)	180 (95%)	10 (5%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	E	195/209 (93%)	183 (94%)	12 (6%)	0	100	100
1	F	195/209 (93%)	181 (93%)	14 (7%)	0	100	100
1	G	191/209 (91%)	181 (95%)	10 (5%)	0	100	100
1	I	188/209 (90%)	184 (98%)	4 (2%)	0	100	100
1	J	187/209 (90%)	180 (96%)	7 (4%)	0	100	100
1	K	195/209 (93%)	186 (95%)	9 (5%)	0	100	100
1	T	195/209 (93%)	182 (93%)	13 (7%)	0	100	100
All	All	1536/1672 (92%)	1457 (95%)	79 (5%)	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 X-ray entries followed by that with respect to entries of similar resolution.

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	144/169 (85%)	137 (95%)	7 (5%)	25	59
1	E	146/169 (86%)	142 (97%)	4 (3%)	44	73
1	F	145/169 (86%)	138 (95%)	7 (5%)	25	60
1	G	149/169 (88%)	146 (98%)	3 (2%)	55	79
1	I	137/169 (81%)	136 (99%)	1 (1%)	84	93
1	J	142/169 (84%)	135 (95%)	7 (5%)	25	59
1	K	142/169 (84%)	137 (96%)	5 (4%)	36	67
1	T	148/169 (88%)	144 (97%)	4 (3%)	44	73
All	All	1153/1352 (85%)	1115 (97%)	38 (3%)	38	68

5 of 38 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	J	62	TYR
1	K	62	TYR

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Mol	Chain	Res	Type
1	J	84	HIS
1	J	177	TRP
1	K	125	ARG

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

Mol	Chain	Res	Type
1	I	97	ASN
1	I	172	ASN
1	J	105	HIS
1	J	97	ASN
1	E	170	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 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, 95^{th} 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	194/209 (92%)	0.15	4 (2%) 63 58	111, 133, 163, 182	0
1	E	197/209 (94%)	0.02	1 (0%) 91 88	91, 107, 141, 149	0
1	F	197/209 (94%)	0.12	3 (1%) 73 68	114, 139, 166, 182	0
1	G	195/209 (93%)	0.15	10 (5%) 28 25	98, 129, 151, 170	0
1	I	192/209 (91%)	0.39	18 (9%) 8 9	104, 136, 153, 165	0
1	J	191/209 (91%)	-0.01	2 (1%) 82 77	96, 111, 130, 151	0
1	K	197/209 (94%)	0.08	2 (1%) 82 77	97, 118, 140, 155	0
1	T	197/209 (94%)	0.06	4 (2%) 65 60	93, 115, 146, 157	0
2	B	19/20 (95%)	-0.38	0 100 100	113, 127, 167, 170	0
2	D	19/20 (95%)	-0.39	0 100 100	115, 125, 167, 172	0
2	M	20/20 (100%)	-0.35	0 100 100	96, 116, 154, 162	0
2	Q	19/20 (95%)	-0.30	1 (5%) 26 24	90, 113, 156, 158	0
All	All	1637/1752 (93%)	0.10	45 (2%) 54 48	90, 124, 155, 182	0

The worst 5 of 45 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	I	50	HIS	4.9
1	I	118	THR	4.7
1	I	48	TYR	4.4
1	I	15	ILE	4.1
1	T	111	GLY	4.1

6.2 Non-standard residues in protein, DNA, RNA chains

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

6.3 Carbohydrates (i)

There are no monosaccharides in this entry.

6.4 Ligands (i)

There are no ligands in this entry.

6.5 Other polymers (i)

There are no such residues in this entry.