



# Full wwPDB X-ray Structure Validation Report ⓘ

Jan 31, 2016 – 06:29 PM GMT

PDB ID : 1B2P  
Title : NATIVE MANNOSE-SPECIFIC BULB LECTIN FROM SCILLA CAMPAN-  
ULATA (BLUEBELL) AT 1.7 ANGSTROMS RESOLUTION  
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Deposited on : 1998-11-30  
Resolution : 1.70 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](mailto:validation@mail.wwpdb.org)  
A user guide is available at  
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity	:	4.02b-467
Mogul	:	1.7 (RC4), CSD as536be (2015)
Xtriage (Phenix)	:	1.9-1692
EDS	:	rb-20026688
Percentile statistics	:	20151230.v01 (using entries in the PDB archive December 30th 2015)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	trunk26865

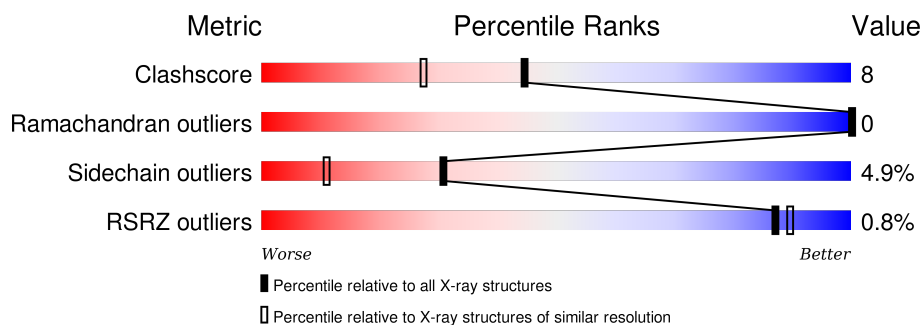
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 1.70 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))
Clashscore	102246	3585 (1.70-1.70)
Ramachandran outliers	100387	3527 (1.70-1.70)
Sidechain outliers	100360	3527 (1.70-1.70)
RSRZ outliers	91569	3200 (1.70-1.70)

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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	119	 62% 32% 5% •
1	B	119	 67% 29% •

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2109 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 PROTEIN (LECTIN).

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	119	Total	C	N	O	S	0	0	0
			932	591	163	175	3			
1	B	119	Total	C	N	O	S	0	0	0
			932	591	163	175	3			

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	27	PHE	TYR	CONFLICT	UNP Q9ZP49
B	27	PHE	TYR	CONFLICT	UNP Q9ZP49

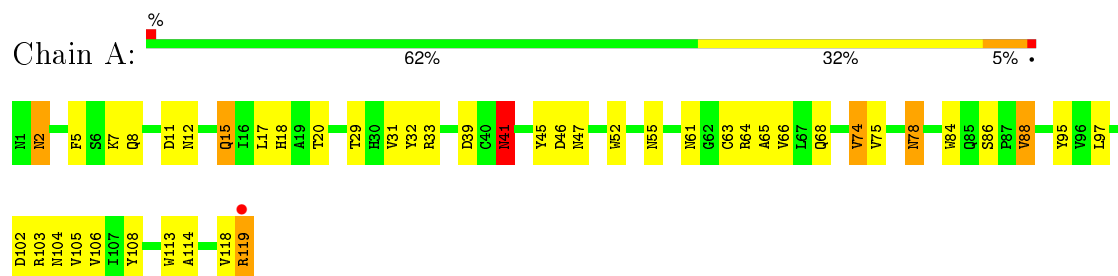
- Molecule 2 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	133	Total	O	0	0
			133	133		
2	B	112	Total	O	0	0
			112	112		

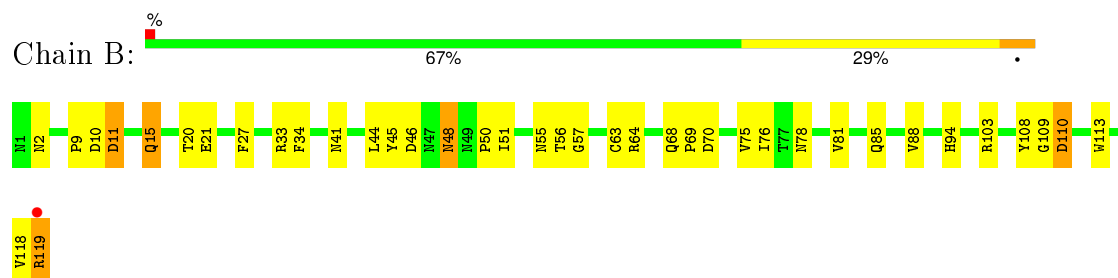
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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: PROTEIN (LECTIN)



#### • Molecule 1: PROTEIN (LECTIN)



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	70.42Å 92.95Å 46.64Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	20.00 – 1.70 19.99 – 1.70	Depositor EDS
% Data completeness (in resolution range)	98.5 (20.00-1.70) 98.3 (19.99-1.70)	Depositor EDS
$R_{merge}$	0.04	Depositor
$R_{sym}$	0.10	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	6.47 (at 1.70Å)	Xtriage
Refinement program	REFMAC	Depositor
R, $R_{free}$	0.186 , 0.208 0.163 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	DCC
Wilson B-factor (Å <sup>2</sup> )	17.3	Xtriage
Anisotropy	0.248	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.39 , 57.0	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.33$	Xtriage
Outliers	0 of 33837 reflections	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	2109	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	22.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.65% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 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	1.45	3/954 (0.3%)	2.41	54/1308 (4.1%)
1	B	1.48	6/954 (0.6%)	2.33	43/1308 (3.3%)
All	All	1.46	9/1908 (0.5%)	2.37	97/2616 (3.7%)

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
1	A	0	1
1	B	0	1
All	All	0	2

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	103	ARG	NE-CZ	9.05	1.44	1.33
1	A	103	ARG	NE-CZ	7.47	1.42	1.33
1	A	95	TYR	CG-CD2	6.38	1.47	1.39
1	B	69	PRO	N-CD	5.80	1.55	1.47
1	B	21	GLU	CD-OE1	-5.61	1.19	1.25
1	B	57	GLY	CA-C	5.59	1.60	1.51
1	B	63	CYS	CB-SG	5.33	1.91	1.82
1	A	105	VAL	N-CA	5.22	1.56	1.46
1	B	64	ARG	NE-CZ	5.08	1.39	1.33

All (97) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	103	ARG	NE-CZ-NH2	-22.84	108.88	120.30
1	A	119	ARG	CD-NE-CZ	19.22	150.51	123.60
1	A	103	ARG	NE-CZ-NH2	-16.73	111.94	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	5	PHE	CB-CG-CD1	-11.97	112.42	120.80
1	B	70	ASP	CB-CG-OD1	11.22	128.40	118.30
1	A	119	ARG	NE-CZ-NH1	11.09	125.85	120.30
1	A	5	PHE	CB-CG-CD2	10.77	128.34	120.80
1	B	64	ARG	NE-CZ-NH2	-10.59	115.00	120.30
1	B	64	ARG	NE-CZ-NH1	10.22	125.41	120.30
1	A	39	ASP	CB-CG-OD2	9.72	127.05	118.30
1	A	65	ALA	O-C-N	9.42	137.77	122.70
1	B	45	TYR	CB-CG-CD2	-8.93	115.64	121.00
1	A	102	ASP	CB-CG-OD2	8.92	126.33	118.30
1	B	75	VAL	O-C-N	8.70	136.61	122.70
1	A	103	ARG	NH1-CZ-NH2	8.44	128.69	119.40
1	A	45	TYR	CZ-CE2-CD2	-8.37	112.27	119.80
1	B	46	ASP	CB-CG-OD1	-8.27	110.86	118.30
1	B	108	TYR	CG-CD1-CE1	-8.23	114.71	121.30
1	B	81	VAL	O-C-N	7.89	135.32	122.70
1	A	75	VAL	O-C-N	7.83	135.24	122.70
1	B	63	CYS	O-C-N	7.82	135.22	122.70
1	A	88	VAL	CA-CB-CG2	7.62	122.33	110.90
1	B	110	ASP	N-CA-CB	-7.48	97.14	110.60
1	A	108	TYR	CB-CG-CD1	-7.46	116.53	121.00
1	A	64	ARG	NE-CZ-NH2	-7.37	116.62	120.30
1	A	46	ASP	CB-CG-OD2	-7.29	111.73	118.30
1	B	56	THR	O-C-N	-7.09	111.14	123.20
1	B	103	ARG	NH1-CZ-NH2	7.07	127.17	119.40
1	B	57	GLY	O-C-N	7.05	135.19	123.20
1	A	106	VAL	O-C-N	6.99	133.88	122.70
1	A	119	ARG	N-CA-CB	6.81	122.86	110.60
1	B	103	ARG	CD-NE-CZ	-6.71	114.20	123.60
1	A	52	TRP	CD1-NE1-CE2	-6.67	103.00	109.00
1	B	20	THR	N-CA-CB	6.66	122.95	110.30
1	B	109	GLY	O-C-N	-6.66	112.05	122.70
1	A	74	VAL	O-C-N	-6.63	112.09	122.70
1	A	84	TRP	O-C-N	6.60	133.26	122.70
1	A	95	TYR	CG-CD2-CE2	-6.60	116.02	121.30
1	B	46	ASP	OD1-CG-OD2	6.50	135.64	123.30
1	B	33	ARG	NE-CZ-NH2	6.49	123.55	120.30
1	A	5	PHE	CG-CD1-CE1	-6.44	113.72	120.80
1	B	108	TYR	CZ-CE2-CD2	-6.41	114.03	119.80
1	B	11	ASP	O-C-N	6.34	132.85	122.70
1	A	17	LEU	O-C-N	6.31	132.80	122.70
1	A	119	ARG	N-CA-C	-6.27	94.07	111.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	110	ASP	CB-CG-OD2	-6.25	112.67	118.30
1	B	27	PHE	C-N-CA	-6.18	109.32	122.30
1	A	63	CYS	CA-CB-SG	-6.18	102.88	114.00
1	B	108	TYR	CD1-CG-CD2	6.17	124.69	117.90
1	B	45	TYR	CG-CD2-CE2	-6.13	116.40	121.30
1	B	103	ARG	NE-CZ-NH1	6.12	123.36	120.30
1	A	20	THR	CA-CB-CG2	-6.10	103.86	112.40
1	B	108	TYR	CB-CG-CD1	-6.08	117.35	121.00
1	A	113	TRP	CG-CD1-NE1	-6.04	104.06	110.10
1	A	74	VAL	CA-C-O	6.04	132.78	120.10
1	A	86	SER	CA-C-O	6.00	132.71	120.10
1	A	32	TYR	CG-CD1-CE1	-5.99	116.51	121.30
1	A	103	ARG	CD-NE-CZ	-5.98	115.23	123.60
1	A	33	ARG	NE-CZ-NH1	-5.93	117.34	120.30
1	A	45	TYR	CG-CD1-CE1	-5.89	116.59	121.30
1	A	119	ARG	NH1-CZ-NH2	-5.88	112.93	119.40
1	A	11	ASP	CA-CB-CG	5.87	126.32	113.40
1	A	63	CYS	O-C-N	5.83	132.02	122.70
1	A	95	TYR	CB-CG-CD1	5.83	124.50	121.00
1	A	12	ASN	O-C-N	5.81	132.00	122.70
1	B	110	ASP	CB-CG-OD1	5.74	123.46	118.30
1	B	41	ASN	O-C-N	5.71	131.84	122.70
1	B	27	PHE	CB-CG-CD2	-5.69	116.82	120.80
1	A	32	TYR	CB-CG-CD2	-5.67	117.60	121.00
1	A	61	ASN	O-C-N	5.66	132.83	123.20
1	A	15	GLN	O-C-N	5.64	131.72	122.70
1	A	113	TRP	CD1-NE1-CE2	5.64	114.07	109.00
1	B	10	ASP	CB-CG-OD1	-5.60	113.26	118.30
1	B	76	ILE	CA-C-O	5.53	131.72	120.10
1	A	104	ASN	O-C-N	5.49	131.49	122.70
1	A	86	SER	O-C-N	-5.49	110.67	121.10
1	A	108	TYR	CZ-CE2-CD2	-5.48	114.87	119.80
1	B	44	LEU	CB-CG-CD1	-5.45	101.73	111.00
1	A	52	TRP	CD1-CG-CD2	-5.45	101.94	106.30
1	B	64	ARG	CD-NE-CZ	-5.44	115.99	123.60
1	B	113	TRP	CH2-CZ2-CE2	5.41	122.81	117.40
1	B	46	ASP	CB-CG-OD2	-5.38	113.46	118.30
1	A	95	TYR	CZ-CE2-CD2	5.35	124.61	119.80
1	A	114	ALA	O-C-N	5.35	131.26	122.70
1	B	33	ARG	NH1-CZ-NH2	-5.34	113.53	119.40
1	A	41	ASN	O-C-N	5.27	131.13	122.70
1	A	95	TYR	CB-CG-CD2	-5.24	117.85	121.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	33	ARG	NE-CZ-NH1	5.15	122.88	120.30
1	B	9	PRO	O-C-N	-5.13	114.49	122.70
1	B	108	TYR	CB-CG-CD2	-5.13	117.92	121.00
1	A	29	THR	O-C-N	5.10	130.86	122.70
1	A	113	TRP	CD1-CG-CD2	5.10	110.38	106.30
1	B	15	GLN	OE1-CD-NE2	5.08	133.58	121.90
1	B	94	HIS	O-C-N	5.07	130.82	122.70
1	A	52	TRP	CG-CD1-NE1	5.07	115.17	110.10
1	B	50	PRO	O-C-N	-5.02	114.67	122.70
1	A	18	HIS	CA-C-O	5.01	130.62	120.10

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	118	VAL	Peptide
1	B	34	PHE	Mainchain

## 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	932	0	909	19	0
1	B	932	0	909	11	0
2	A	133	0	0	5	2
2	B	112	0	0	6	1
All	All	2109	0	1818	29	2

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 8.

All (29) 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:68:GLN:HG2	2:A:192:HOH:O	1.27	1.27

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:85:GLN:NE2	2:B:165:HOH:O	1.91	1.02
1:B:48:ASN:ND2	2:B:216:HOH:O	1.98	0.95
1:A:2:ASN:HD22	1:A:2:ASN:H	1.32	0.76
1:B:118:VAL:O	1:B:119:ARG:HB2	1.87	0.73
1:A:68:GLN:CG	2:A:192:HOH:O	2.09	0.61
1:A:2:ASN:HD22	1:A:2:ASN:N	2.00	0.59
1:B:118:VAL:O	1:B:119:ARG:HD3	2.04	0.58
1:B:55:ASN:ND2	2:B:221:HOH:O	2.29	0.58
1:B:15:GLN:O	2:B:231:HOH:O	2.18	0.56
1:B:110:ASP:OD1	2:B:141:HOH:O	2.19	0.52
1:A:66:VAL:HG22	1:A:74:VAL:HG23	1.91	0.52
1:A:66:VAL:CG2	1:A:74:VAL:CG2	2.91	0.48
1:A:8:GLN:H	1:A:15:GLN:NE2	2.13	0.47
1:A:68:GLN:NE2	2:A:192:HOH:O	2.46	0.46
1:A:8:GLN:H	1:A:15:GLN:HE22	1.64	0.46
1:A:2:ASN:HD21	1:B:2:ASN:HD21	1.63	0.45
1:A:47:ASN:ND2	2:A:237:HOH:O	2.50	0.45
1:A:31:VAL:H	1:A:47:ASN:ND2	2.14	0.45
1:A:55:ASN:ND2	2:A:246:HOH:O	2.48	0.44
1:B:68:GLN:NE2	2:B:147:HOH:O	2.51	0.44
1:A:66:VAL:HG22	1:A:74:VAL:CG2	2.48	0.43
1:A:41:ASN:HD21	1:A:55:ASN:H	1.65	0.43
1:A:97:LEU:HD23	1:A:97:LEU:C	2.39	0.42
1:B:118:VAL:O	1:B:119:ARG:CB	2.60	0.42
1:A:78:ASN:C	1:A:78:ASN:HD22	2.23	0.41
1:A:7:LYS:HA	1:A:15:GLN:NE2	2.36	0.40
1:B:51:ILE:O	1:B:51:ILE:HG22	2.21	0.40
1:A:2:ASN:ND2	1:A:2:ASN:H	2.08	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:A:237:HOH:O	2:A:237:HOH:O[2_665]	0.64	1.56
2:A:139:HOH:O	2:B:144:HOH:O[4_455]	1.04	1.16

## 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 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	117/119 (98%)	112 (96%)	5 (4%)	0	100	100
1	B	117/119 (98%)	112 (96%)	5 (4%)	0	100	100
All	All	234/238 (98%)	224 (96%)	10 (4%)	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 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	103/103 (100%)	98 (95%)	5 (5%)	31	11
1	B	103/103 (100%)	98 (95%)	5 (5%)	31	11
All	All	206/206 (100%)	196 (95%)	10 (5%)	31	11

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	ASN
1	A	41	ASN
1	A	78	ASN
1	A	88	VAL
1	A	119	ARG
1	B	11	ASP
1	B	48	ASN
1	B	78	ASN

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Mol	Chain	Res	Type
1	B	88	VAL
1	B	119	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	2	ASN
1	A	12	ASN
1	A	15	GLN
1	A	41	ASN
1	A	47	ASN
1	A	55	ASN
1	A	78	ASN
1	B	12	ASN
1	B	13	HIS
1	B	48	ASN
1	B	78	ASN
1	B	80	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 carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

There are no ligands in this entry.

## 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.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	119/119 (100%)	-0.12	1 (0%) 87 90	12, 19, 31, 46	0
1	B	119/119 (100%)	-0.12	1 (0%) 87 90	12, 18, 30, 55	0
All	All	238/238 (100%)	-0.12	2 (0%) 87 90	12, 19, 30, 55	0

All (2) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	119	ARG	3.4
1	A	119	ARG	2.4

### 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 carbohydrates 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.