wwPDB X-ray Structure Validation Summary Report (i)

May 14, 2020 – 10:10 pm BST

PDB ID	:	3WWK
Title	:	Crystal structure of CLEC-2 in complex with rhodocytin
Authors	:	Nagae, M.; Morita-Matsumoto, K.; Kato, M.; Kato-Kaneko, M.; Kato, Y.; Yamaguchi, Y.
Deposited on	:	2014-06-20
Resolution	:	2.98 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 following versions of software and data (see references (1)) were used in the production of this report:

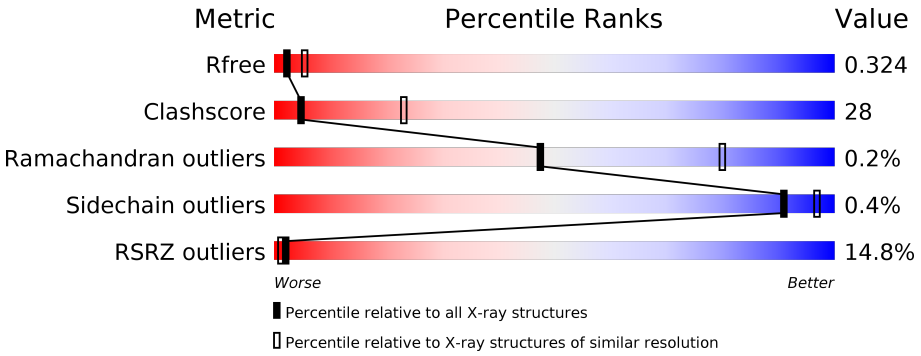
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.11
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.11

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 2.98 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	2754 (3.00-2.96)
Clashscore	141614	3103 (3.00-2.96)
Ramachandran outliers	138981	2993 (3.00-2.96)
Sidechain outliers	138945	2996 (3.00-2.96)
RSRZ outliers	127900	2644 (3.00-2.96)

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 >=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	C	128	23% 74% 21% 5%
1	F	128	38% 69% 27% 5%
1	I	128	11% 73% 22% 5%
1	L	128	28% 46% 48% • 5%
2	A	136	10% 66% 26% • ••
2	D	136	15% 63% 30% • ••

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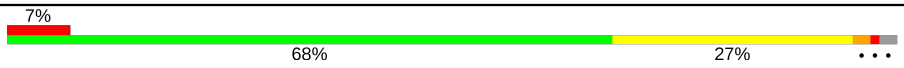
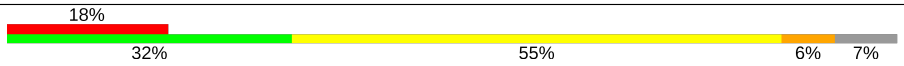
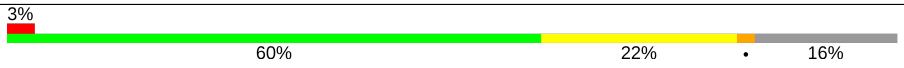
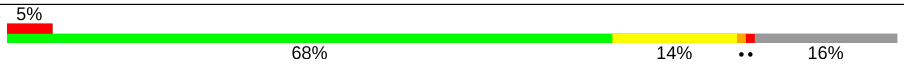
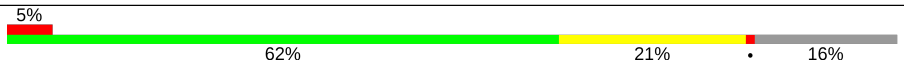
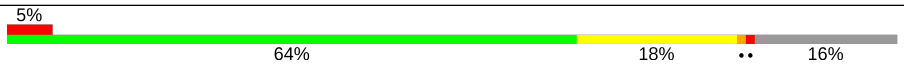
Mol	Chain	Length	Quality of chain
2	G	136	
2	J	136	
3	B	146	
3	E	146	
3	H	146	
3	K	146	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 12453 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 C-type lectin domain family 1 member B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	C	122	Total	C	N	O	S	0	0	0
			1023	644	180	188	11			
1	I	122	Total	C	N	O	S	0	0	0
			1023	644	180	188	11			
1	L	122	Total	C	N	O	S	0	0	0
			1023	644	180	188	11			
1	F	122	Total	C	N	O	S	0	0	0
			1023	644	180	188	11			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	94	GLY	-	EXPRESSION TAG	UNP Q9P126
C	95	SER	-	EXPRESSION TAG	UNP Q9P126
C	99	SER	CYS	ENGINEERED MUTATION	UNP Q9P126
I	94	GLY	-	EXPRESSION TAG	UNP Q9P126
I	95	SER	-	EXPRESSION TAG	UNP Q9P126
I	99	SER	CYS	ENGINEERED MUTATION	UNP Q9P126
L	94	GLY	-	EXPRESSION TAG	UNP Q9P126
L	95	SER	-	EXPRESSION TAG	UNP Q9P126
L	99	SER	CYS	ENGINEERED MUTATION	UNP Q9P126
F	94	GLY	-	EXPRESSION TAG	UNP Q9P126
F	95	SER	-	EXPRESSION TAG	UNP Q9P126
F	99	SER	CYS	ENGINEERED MUTATION	UNP Q9P126

- Molecule 2 is a protein called Snaclec rhodocytin subunit alpha.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	A	133	Total	C	N	O	S	0	0	0
			1092	688	180	216	8			
2	D	133	Total	C	N	O	S	0	0	0
			1092	688	180	216	8			

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	G	133	Total	C	N	O	S	0	0	0
			1092	688	180	216	8			
2	J	127	Total	C	N	O	S	0	0	0
			1045	661	174	202	8			

- Molecule 3 is a protein called Snaclec rhodocytin subunit beta.

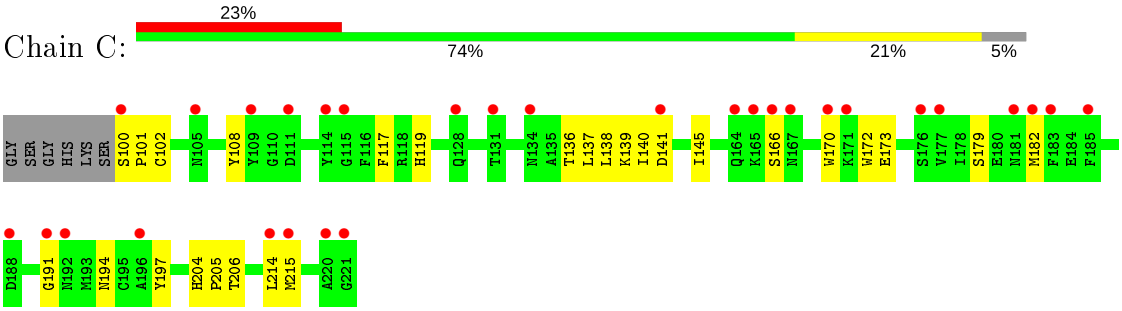
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	B	123	Total	C	N	O	S	0	0	0
			1010	642	177	181	10			
3	E	123	Total	C	N	O	S	0	0	0
			1010	642	177	181	10			
3	H	123	Total	C	N	O	S	0	0	0
			1010	642	177	181	10			
3	K	123	Total	C	N	O	S	0	0	0
			1010	642	177	181	10			

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 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.

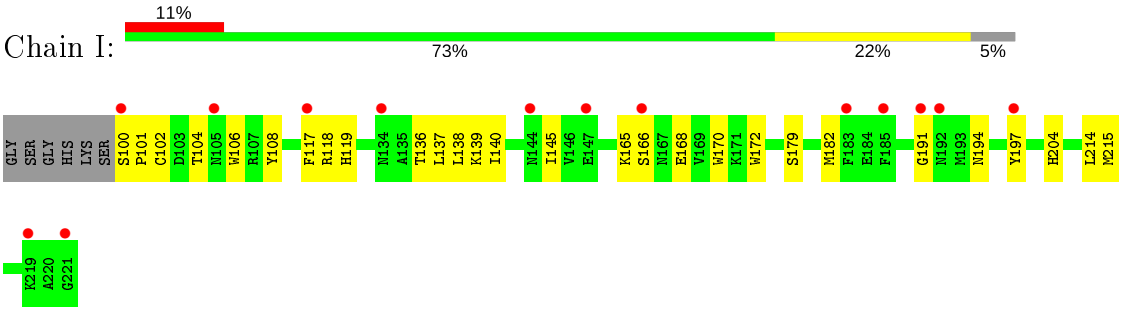
- Molecule 1: C-type lectin domain family 1 member B

Chain C:



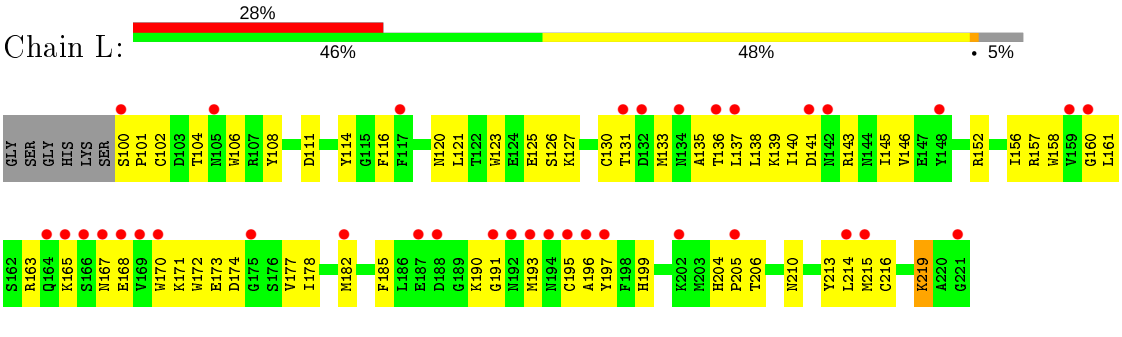
- Molecule 1: C-type lectin domain family 1 member B

Chain I:



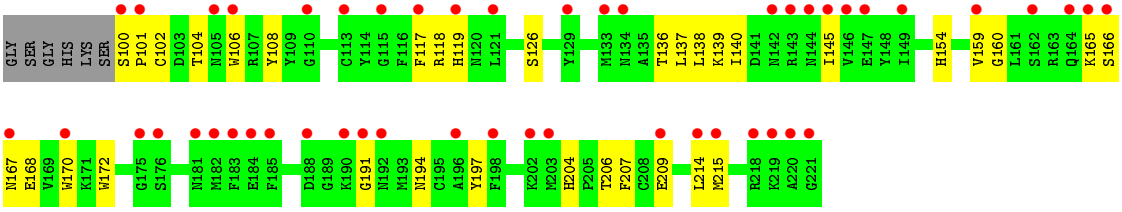
- Molecule 1: C-type lectin domain family 1 member B

Chain L:



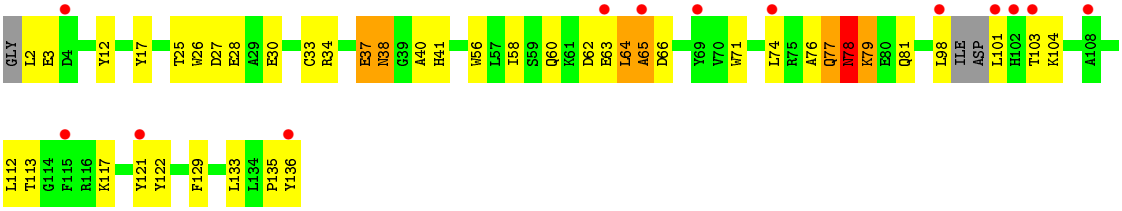
- Molecule 1: C-type lectin domain family 1 member B

Chain F:



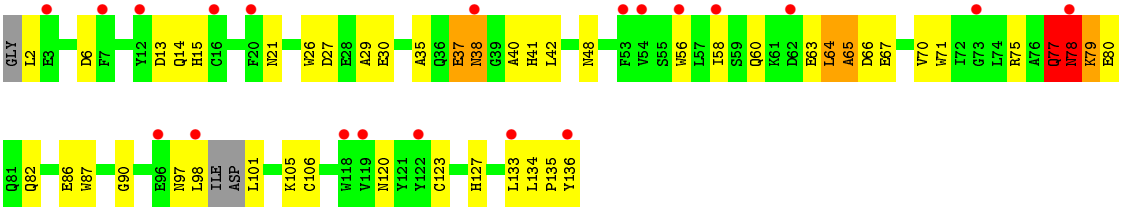
• Molecule 2: Snaclec rhodocytin subunit alpha

Chain A:



• Molecule 2: Snaclec rhodocytin subunit alpha

Chain D:

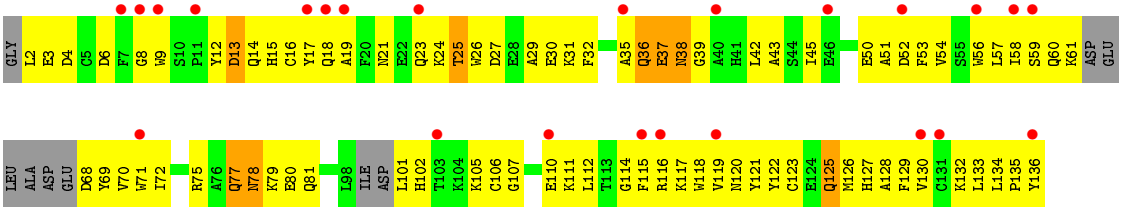


• Molecule 2: Snaclec rhodocytin subunit alpha

Chain G:

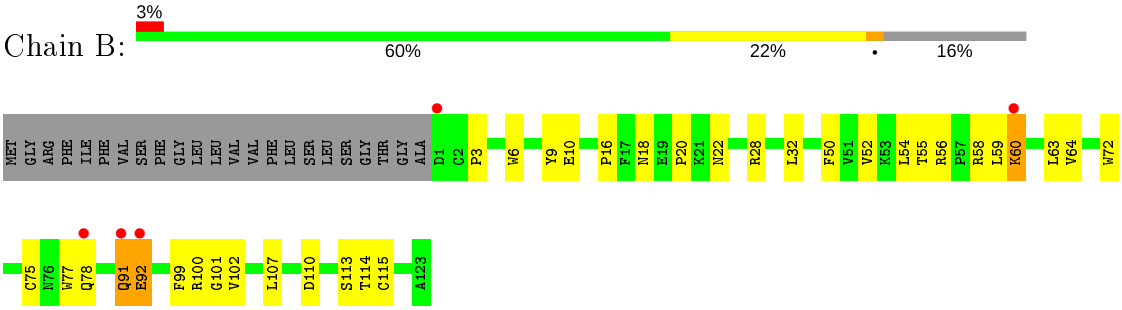
• Molecule 2: Snaclec rhodocytin subunit alpha

Chain J:



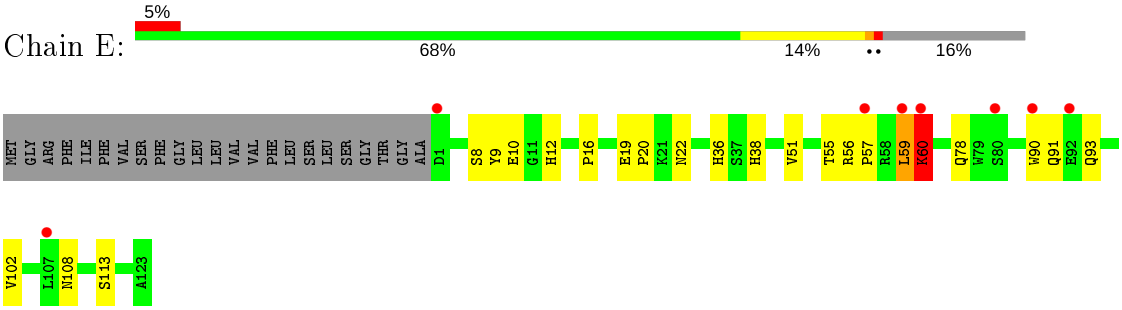
• Molecule 3: Snaclec rhodocytin subunit beta

Chain B:



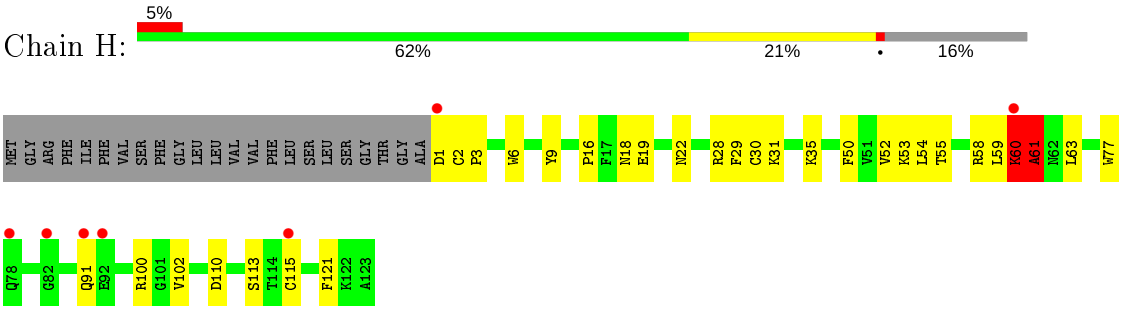
• Molecule 3: Snaclec rhodocytin subunit beta

Chain E:



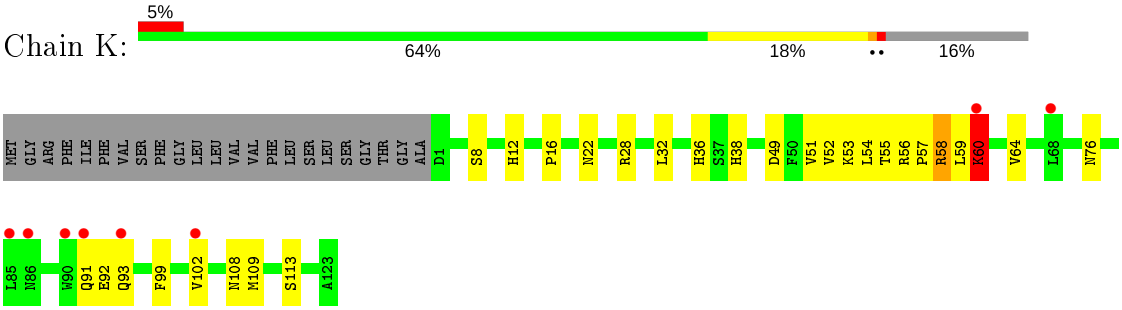
• Molecule 3: Snaclec rhodocytin subunit beta

Chain H:



• Molecule 3: Snaclec rhodocytin subunit beta

Chain K:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	130.85Å 117.07Å 152.24Å 90.00° 115.78° 90.00°	Depositor
Resolution (Å)	37.56 – 2.98 37.36 – 2.99	Depositor EDS
% Data completeness (in resolution range)	98.0 (37.56-2.98) 98.3 (37.36-2.99)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.10	Depositor
$< I/\sigma(I) >$ [1]	3.97 (at 3.01Å)	Xtriage
Refinement program	REFMAC 5.8.0049	Depositor
R, R_{free}	0.282 , 0.325 0.282 , 0.324	Depositor DCC
R_{free} test set	2117 reflections (5.09%)	wwPDB-VP
Wilson B-factor (Å^2)	50.4	Xtriage
Anisotropy	0.587	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.28 , -2.5	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.347 for h,-k,-h-l	Xtriage
Reported twinning fraction	0.649 for H, K, L 0.351 for -H, -K, H+L	Depositor
Outliers	2 of 41626 reflections (0.005%)	Xtriage
F_o,F_c correlation	0.85	EDS
Total number of atoms	12453	wwPDB-VP
Average B, all atoms (Å^2)	60.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.03% 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	C	0.41	0/1052	0.62	0/1415
1	F	0.41	0/1052	0.61	0/1415
1	I	0.42	0/1052	0.60	0/1415
1	L	0.50	0/1052	0.70	0/1415
2	A	0.50	0/1121	0.82	3/1513 (0.2%)
2	D	0.51	0/1121	0.93	6/1513 (0.4%)
2	G	0.46	0/1121	0.78	4/1513 (0.3%)
2	J	0.51	0/1073	0.86	3/1446 (0.2%)
3	B	0.54	0/1045	0.76	2/1416 (0.1%)
3	E	0.49	0/1045	0.72	2/1416 (0.1%)
3	H	0.52	0/1045	0.83	7/1416 (0.5%)
3	K	0.52	0/1045	0.76	3/1416 (0.2%)
All	All	0.49	0/12824	0.76	30/17309 (0.2%)

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	A	0	6
2	D	0	6
2	G	0	5
2	J	0	4
3	B	0	2
3	E	0	2
3	H	0	3
3	K	0	2
All	All	0	30

There are no bond length outliers.

The worst 5 of 30 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	78	ASN	N-CA-CB	-11.67	89.60	110.60
3	H	60	LYS	CA-C-N	-10.08	95.02	117.20
3	E	60	LYS	N-CA-C	9.43	136.46	111.00
2	D	78	ASN	N-CA-C	-8.62	87.72	111.00
3	K	60	LYS	N-CA-C	8.55	134.08	111.00

There are no chirality outliers.

5 of 30 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	A	37	GLU	Peptide
2	A	64	LEU	Peptide
2	A	65	ALA	Peptide
2	A	77	GLN	Mainchain,Peptide
2	A	78	ASN	Peptide

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	C	1023	0	947	24	0
1	F	1023	0	947	37	0
1	I	1023	0	947	19	0
1	L	1023	0	947	127	0
2	A	1092	0	984	68	0
2	D	1092	0	984	67	1
2	G	1092	0	984	42	0
2	J	1045	0	947	181	1
3	B	1010	0	932	40	0
3	E	1010	0	930	28	0
3	H	1010	0	932	29	0
3	K	1010	0	932	32	0
All	All	12453	0	11413	664	1

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 28.

The worst 5 of 664 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)
2:J:45:ILE:HD11	2:J:51:ALA:CB	1.57	1.34
2:G:78:ASN:OD1	2:G:79:LYS:HA	1.30	1.28
1:L:196:ALA:HA	1:L:204:HIS:O	1.08	1.25
1:L:130:CYS:HB3	1:L:136:THR:N	1.49	1.25
2:J:45:ILE:CD1	2:J:51:ALA:HB2	1.70	1.22

All (1) 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:D:48:ASN:ND2	2:J:52:ASP:OD2[3_545]	2.16	0.04

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	C	120/128 (94%)	117 (98%)	3 (2%)	0	100	100
1	F	120/128 (94%)	117 (98%)	3 (2%)	0	100	100
1	I	120/128 (94%)	118 (98%)	2 (2%)	0	100	100
1	L	120/128 (94%)	115 (96%)	5 (4%)	0	100	100
2	A	129/136 (95%)	114 (88%)	15 (12%)	0	100	100
2	D	129/136 (95%)	113 (88%)	15 (12%)	1 (1%)	19	55
2	G	129/136 (95%)	117 (91%)	12 (9%)	0	100	100
2	J	121/136 (89%)	103 (85%)	17 (14%)	1 (1%)	19	55
3	B	121/146 (83%)	113 (93%)	8 (7%)	0	100	100
3	E	121/146 (83%)	112 (93%)	9 (7%)	0	100	100
3	H	121/146 (83%)	113 (93%)	7 (6%)	1 (1%)	19	55
3	K	121/146 (83%)	112 (93%)	9 (7%)	0	100	100
All	All	1472/1640 (90%)	1364 (93%)	105 (7%)	3 (0%)	47	80

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	H	61	ALA
2	D	78	ASN
2	J	13	ASP

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	C	110/114 (96%)	110 (100%)	0	100 100
1	F	110/114 (96%)	110 (100%)	0	100 100
1	I	110/114 (96%)	110 (100%)	0	100 100
1	L	110/114 (96%)	109 (99%)	1 (1%)	78 91
2	A	116/118 (98%)	115 (99%)	1 (1%)	78 91
2	D	116/118 (98%)	114 (98%)	2 (2%)	60 84
2	G	116/118 (98%)	115 (99%)	1 (1%)	78 91
2	J	111/118 (94%)	110 (99%)	1 (1%)	78 91
3	B	109/127 (86%)	109 (100%)	0	100 100
3	E	109/127 (86%)	109 (100%)	0	100 100
3	H	109/127 (86%)	109 (100%)	0	100 100
3	K	109/127 (86%)	109 (100%)	0	100 100
All	All	1335/1436 (93%)	1329 (100%)	6 (0%)	91 97

5 of 6 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	D	101	LEU
1	L	219	LYS
2	G	64	LEU
2	D	78	ASN
2	J	125	GLN

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 37 such sidechains are listed below:

Mol	Chain	Res	Type
1	I	119	HIS
2	G	41	HIS
1	L	204	HIS
1	I	200	ASN
2	G	18	GLN

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

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	C	122/128 (95%)	1.38	30 (24%) 0 0	65, 78, 92, 96	8 (6%)
1	F	122/128 (95%)	1.96	49 (40%) 0 0	76, 87, 103, 108	8 (6%)
1	I	122/128 (95%)	0.90	14 (11%) 4 2	53, 63, 81, 87	8 (6%)
1	L	122/128 (95%)	1.61	36 (29%) 0 0	64, 71, 84, 93	8 (6%)
2	A	133/136 (97%)	0.89	13 (9%) 7 4	41, 53, 63, 69	0
2	D	133/136 (97%)	1.02	20 (15%) 2 1	46, 70, 80, 86	0
2	G	133/136 (97%)	0.80	9 (6%) 17 9	39, 50, 59, 63	0
2	J	127/136 (93%)	1.31	24 (18%) 1 0	44, 72, 82, 102	0
3	B	123/146 (84%)	0.64	5 (4%) 37 22	36, 44, 57, 61	0
3	E	123/146 (84%)	0.68	8 (6%) 18 10	37, 47, 67, 72	0
3	H	123/146 (84%)	0.73	7 (5%) 23 13	35, 42, 56, 61	0
3	K	123/146 (84%)	0.77	8 (6%) 18 10	37, 45, 64, 67	0
All	All	1506/1640 (91%)	1.05	223 (14%) 2 1	35, 59, 89, 108	32 (2%)

The worst 5 of 223 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	221	GLY	9.7
1	L	221	GLY	8.5
1	F	143	ARG	7.6
1	C	191	GLY	7.6
2	J	58	ILE	6.6

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 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.